

ABSTRACT

Title of Dissertation:

THE MEDIATING EFFECTS OF THEORY OF
MIND ON RELATIONS BETWEEN
TEMPERAMENT AND SOCIAL
COMPETENCE

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To better understand one mechanism by which social cognition affects social outcomes, the current study proposed that young children's differences in temperament and Theory of Mind (ToM) contribute to teachers' perceptions of their social competence (SC). Temperament refers to biologically based differences in behavioral regulation and reactivity, whereas ToM describes the process of inferring others' mental states and making predictions about related behavior. This study examined the effects of ToM on relations between temperament and SC. Moreover, it expanded ToM measurement beyond traditional methods that explicitly provide the information required to correctly ascertain social cognitions (termed truth-based ToM) by introducing a novel approach to defining and measuring ToM that captures the individualistic process of inferring mental

states without direct access to all relevant information (termed interpretation-based ToM).

Two mediation models were proposed. The first hypothesized that both types of ToM would mediate relations between temperamental effortful control and SC. Results revealed a significant positive indirect effect for truth-based ToM, suggesting that effortful control positively influences truth-based ToM, which in turn positively influences SC. Results did not yield a significant indirect effect for interpretation-based ToM, suggesting that these may be multiply influenced. This was confirmed by the second model which illustrated connections between temperamental negative reactivity, ToM, and SC. It was hypothesized that interpretation-based ToM would mediate relations between negative affectivity and SC, with a moderating effect by effortful control. Results revealed a significant positive moderated indirect effect, suggesting that negative affectivity positively influences interpretation-based ToM, which in turn positively influences SC, specifically when effortful control is high.

This study showcased a novel way to define and measure a subtype of ToM that captures the construct more broadly and may be more relevant when interpreting incomplete information than when all situational cues are explicitly provided. Moreover, results of the moderated mediation model illustrated the positive role of negative affectivity when paired with high effortful control in facilitating this more complex form of interpretation-based ToM and eventual SC. Implications of the findings for literature on ToM, temperament, and SC in young children are discussed.

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TEMPERAMENT AND SOCIAL COMPETENCE

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Chapter 1: Introduction

Using a Social Information Processing (SIP) framework (Crick & Dodge, 1994; Lemerise & Arsenio, 2000) to understand children's individual contributions to their social adjustment, this study examines how characteristics of temperament and Theory of Mind (ToM) influence individual differences in children's social functioning at school. Temperament refers to predisposed differences in behavioral reactivity and regulation (Rothbart, 1994), whereas ToM describes the ability to represent others' mental states (e.g., Astington & Jenkins, 1995). Social competence (SC), generally defined as effectiveness in social interactions (Rose-Krasnor, 1997), is increasingly recognized as a vital component to children's success, affecting their academic performance, quality of peer and teacher interactions, and even potential school drop-out (Raver and Knitzer, 2002; Hamre & Pianta, 2001; Ladd et al., 2006). SC promotes children's adjustment in school by enabling them to initiate and respond to social advances and build positive relationships with peers and teachers (Ladd et al., 2006). Socially competent children are also better able to meet academic demands by using social skills such as self-control, cooperation, and responsibility (Ladd et al., 2006).

Previous research suggests that some temperamental traits contribute to children's SC (e.g., Eisenberg et al., 2009). Children who display high levels of negative emotionality tend to show antisocial behavior such as aggression (Nozadi et al., 2018; Rothbart et al., 1994) whereas high levels of regulatory traits such as effortful control tend to be related to greater SC (Rothbart et al., 1994; Teglassi et al., 2015; Zhou et al., 2010). Temperament dimensions influence children's approach to and participation in social interactive experiences which reflect and impact children's social understanding

(Rothbart & Bates, 2006; Wellman et al., 2011). Within a SIP framework, individual differences in the experience of emotions may influence what is noticed and the meaning attributed to the social environment (i.e., SIP; Lemerise and Arsenio; 2000), thereby implicating the role of temperament in SIP. As such, the extent to which children are able to infer others' mental states (i.e., ToM) may be influenced by temperamental traits. Despite this theoretical link, studies examining links between ToM and temperament are sparse and inconsistent with some identifying links with temperamental regulation (e.g., Carlson & Moses, 2001; Blair & Razza, 2007); others not (e.g., Carlson et al., 2004; Lane et al., 2013) and no studies identifying links with ToM and temperamental negative reactivity (e.g., LaBounty et al., 2016; Longobardi et al., 2017).

The dearth of empirical links between temperament and ToM may, in part, be explained by the constraints of commonly used ToM measures. In this study, it is argued that popular ToM measures for young children only capture one key phenomenon of ToM, which is the ability to mentally represent *truths* about external reality (socially constructed) when the information is explicitly provided (e.g., identifying that Sally does not know the true location of an object because she was absent when John moved it). In this study, this type of ToM is termed truth-based ToM. However, conceptually, the phenomenon of inferring others' mental states takes place without direct access to the other's perspective and involves more complexity than inferring situational truths. Hence, ToM also involves the highly individualistic process of *interpreting* reality (personally constructed), which varies from person to person based on their prior experiences and views of the world (e.g., attributing intent to someone's actions in an ambiguous situation). In this study, this type of ToM is termed interpretation-based ToM.

In situations with clear response expectations, truth-based ToM would suffice in order to size up the situation accurately. As an example, truth-based ToM may involve predicting that someone will look for a toy where they last left it (their belief about the location) even though one knows it has been moved (your belief/ reality). On the other hand, more challenging, emotion laden situations require the individual to interpret the nuances of a specific exchange to inform behavior. As an example, interpretation-based ToM may involve predicting how others may react based on how one enters a peer group by drawing on past experiences (personal schemas) to infer their beliefs, motivations, intentions, and emotions. Moreover, negative emotions (i.e., temperamental reactivity) may not have much impact on the simplistic and relatively automatic SIP that takes place in routine situations with clear expectations. Truth-based ToM can likely be accessed readily in such routine situations, and the presence of higher temperamental regulation would allow the individual to develop and use that truth-based ToM. In contrast, both temperamental regulation and reactivity may play a substantial role in emotion laden social contexts with unclear response expectations where an individual has to regulate negative emotions and remain perceptive of subtle social cues in order to take another's perspective (i.e., ToM) and act in a socially effective manner. As such, when ToM is measured as an interpretation-based rather than truth-based endeavor, it may provide nuanced insight into how children's temperament is linked to individual differences in processing social information for effective exchanges, and eventual SC. Based on existing research and theory, it was proposed that children's ToM abilities mediate relations between reactive and regulatory temperamental factors and SC. Moreover, temperamental regulation and reactivity may join together and interact (e.g., Lonigan &

Vasey, 2009) in their influences on how children engage with their surroundings and construct knowledge about their social world in emotion laden contexts with unclear response expectations.

Chapter 2: Literature Review

Social Competence

Social Competence (SC) is a complex and multidimensional construct that has been conceptualized in numerous ways (e.g., Cavell, 1990; Denham et al., 1994; Dirks et al., 2007; Rose-Krasnor, 1997). Most definitions include that SC concerns effective interactions with others in order to accomplish certain goals (e.g., Dirks et al., 2007; Rubin & Rose-Krasnor, 1992; Rose-Krasnor 1997; Waters & Sroufe, 1983). Most theorists emphasize that social competence is judged based on how *appropriate* these interactions are, thus excluding socially manipulative behavior from the definition (Rubin & Rose-Krasnor, 1992). In this study, the construct is understood through an interpersonal framework where SC refers to the ability to achieve personal goals in social interaction while maintaining positive relationships with others over time and across situations (Dodge, 1986; Rose-Krasnor, 1997; Rubin & Rose-Krasnor, 1992). Hence, socially competent behaviors are deployed through the use of interpersonal problem-solving skills (Rubin & Rose-Krasnor, 1992).

Children regularly face social “challenges” that range in magnitude, for example a sibling taking away a toy (likely minor) to being routinely excluded from a game at school (could be major) with corresponding goals, depending on the individual needs and abilities of the child. Children who routinely solve these challenges effectively are reinforced in their behaviors and experience the world as a welcoming place. Conversely, those who lack the interpersonal problem-solving skills likely experience repeated social failure, which places them at risk for developing poor self-esteem (Hymel & Franke, 1985; Mota & Matos, 2013), as well as externalizing (e.g., aggression; Takahashi et al.,

2009; Merrill et al., 2017) or internalizing (e.g., social withdrawal; Coplan et al., 2018) problems. They may enter a negative cycle as they are unable to form positive relationships, thereby missing out on the social learning opportunities (i.e., development of social cognition and social skills) that their socially competent peers enjoy (Henderson et al., 2018; Piaget, 1926; Rubin & Rose-Krasnor, 1992). Through social negotiation, children learn to understand others' thoughts, emotions, motives and intentions (Piaget, 1926; Rubin & Rose-Krasnor, 1992). In turn, armed with these new social understandings, the child can consider potential consequences of his or her behaviors to engage in appropriate and effective social behavior. Thus, social problem solving involves cohesive linkages between social cognitions and behaviors. Socially competent behavior is driven by problem solving that is intentional (i.e., goal driven) and informed by social cognitions such as perspective taking and understanding social causality (Battistich et al., 1989).

Social Information Processing (SIP) models of social competence. Social information processing (SIP) theory provides an explanation about how children make decisions in social interactions (Crick & Dodge, 1994). A basic premise of SIP is that children's understanding and interpretation of situations influences their related behavior (Crick & Dodge, 1994). SIP models of social competence assume that social information gets processed rapidly, and often automatically at the unconscious level, in real time (Rubin & Rose-Krasnor, 1992). Theorists outline steps of information processing that follow a particular sequence, and agree that the steps are dynamically interrelated, yet separable. A few of the of the most widely accepted models of SIP are outlined below. Although they overlap in many ways, they primarily differ in their focus on either

internalizing (Rubin & Rose Krasnor) and or externalizing social difficulties (Crick & Dodge, and later Lemerise and Arsenio) and research procedures.

Rubin and Krasnor' (1986) information processing model of social competence considers children's social goals, the means by which strategies are accessed and chosen to achieve these goals, the production of strategic behaviors, the outcome of the initial social attempt, and the sequencing of goals and strategies following failure. These processes are identified within particular social contexts (task environmental factors). Finally, they consider internalized attributions, self-perceptions, and emotions as significant contributors to the display of socially competent behaviors. According to Rubin and Rose-Krasnor (1992), social behaviors primarily reflect automaticity in thinking as most social interactions are routine and use social scripts (e.g., greeting behavior) that are learned quickly and easily accessed to respond effectively to highly familiar social situations. When the familiar conditions that elicit social scripts are absent, a "social problem" exists, and script-driven behavior is precluded. Given children's limited social experience, they often face situations that are novel, violate expectations, and that have led to unsuccessful resolutions in the past.

Children's social goals and strategy selection may be automatic or deliberate, depending on the information they notice about the context. If a situation lends itself to scripted behavior, strategy selection is relatively automatic. However, if anything about the situation is novel or unexpected, active, conscious processing occurs. Rubin and Krasnor (1986) describe several ways that strategies are chosen to achieve social goals including drawing from past exchanges or generating multiple options and selecting the first one deemed appropriate for the context. Strategies may be generated as either a

direct means to achieve a goal (e.g., grab the toy), or as a step toward goal attainment (e.g., putting a peer in a good mood before moving to the ultimate goal of getting the toy). Once a strategy is selected and implemented, the outcome is evaluated. The child “reads” the environment to assess the relative success of the exchange. If the strategy is judged to be successful, the problem-solving process ends, and the information is retained in long term memory. If a strategy has been judged as partially successful, the child may accept the outcome as "successful enough" and proceed as if the outcome was a success; or judge it to be a failure. Thus, the social problem-solving process operates as a negative feedback system. If the social interchange is judged to have failed, the child may leave the goal unattained (information about the relative ineffectiveness of the strategy in the particular context is stored for future access) and choose a new or modified goal, repeat the original strategy, or alter the previous strategy while maintaining the same goal. Each choice may involve more or less cognitive reflection, and is influenced by self-perceptions of competence, the causal attributions generated after failure, and the affect associated with the social target or with the failure experience. These cumulative choices, consequences, and related self-perceptions become woven into the child’s schemas about themselves and about how the world works and continue to influence their social behaviors moving forward (Augustinos & Innes, 1990).

Crick and Dodge’s (1986) SIP model is similar to Rubin and Rose Krasnor’s in assuming that children draw from past experiences when they enter social exchanges but adds an emphasis on biologically determined tendencies influencing SIP. In accordance with other SIP models, “steps” are presumed to occur rapidly and simultaneously, with numerous feedback loops (see Crick & Dodge, 1994; Dodge, 1986, for more details). For

the purpose of clarity, the authors describe the steps sequentially. Briefly, SIP begins when the child attends to, encodes (step 1) and interprets social cues (step 2) (i.e., “reading” the context). Here, the child figures out what is happening, (e.g., a peer pushed him) and why (e.g., accident or on purpose). Next, goals are clarified (Step 3; e.g., maintain relationships or establish a certain reputation) and possible responses are generated (step 4). These responses are evaluated in terms of anticipated outcomes, relations to goal(s), and self-efficacy for performing the response and, one or more response is selected (step 5). Finally, the response is enacted (step 6) and the cycle begins again as the child notices and interprets how peers respond. Thus, the extent to which the child accurately encodes and processes social information, paired with the ability to select and enact an appropriate response, results in relatively more or less socially competent behavior.

More recently, Lemerise and Arsenio (2000) provided an updated model, integrating emotion processes into each step of the SIP model. The authors note that effective SIP first involves encoding and interpreting both one’s own internal and others’ external emotion cues, along with other situational cues (steps 1 and 2). They explain that one’s own and others’ affective signals provide ongoing information about how the encounter is proceeding, allowing for sensitive adjustments to behavior. Mood, emotions, and/or arousal can affect what is noticed about a social encounter and make the recollection of mood-congruent information more likely, thus influencing interpretation of social cues. Moreover, the intensity with which children experience emotions, combined with their ability to regulate emotion, will influence what is noticed and the meaning attributed to the situation. Lemerise and Arsenio (2000) emphasize that goals

can be either internal (e.g., maintaining or regulating emotion) or external (e.g., instrumental goals, such as being the first to go down the slide, or social relational goals, like getting another to play with you). With this in mind, they suggest that goal identification can be influenced by peers' affective cues, as well as the intensity with which the individual experiences emotions and his or her ability to regulate those emotions. Strelau (2008) proposes that highly reactive individuals use "auxiliary" behaviors to regulate stress while simultaneously engaging in actions that are goal directed. A child with high arousal and *poor* regulatory abilities might favor a goal that relieves immediate distress as they do not have the ability to engage in auxiliary behaviors while focusing on a more complex goal such as maintaining positive social relationships.

When generating, evaluating, and selecting responses, children may again favor responses that would modify a certain emotion. Feeling angry, scared, or happy may cue different response types as they connect to presentations of past experiences or schemas. (E.g., if avoidance is associated with reduction in anxiety, accessing avoidant responses may moderate feelings of fear). Children who experience strong emotions may be too overwhelmed and self-focused to generate a variety of responses and evaluate them from all parties' perspectives. They are likely to act preemptively and respond in ways that do not further the social interaction, like running away or angrily retaliating. Conversely, children who are able to regulate their emotions effectively are in a better position to engage in effortful processing and select responses that match social goals. Finally, when enacting the response, it is important to display emotions appropriate to the situation, which requires both control over one's expressivity and awareness of other stakeholders'

perspectives. Emotion cues provide an ongoing source of information about how the encounter is proceeding, allowing the child to make adjustments to his/ her actions, while children with SIP and/ or emotion regulation deficits may continue to respond rigidly. Once the response is enacted, emotional cues can inform the child (if he/she is attuned to it) about the success or failure of his/her actions, and it becomes part of the child's database of social knowledge.

Taken together, SIP provides a framework to understand how individuals notice and use information about the environment to form goals, act upon them, and evaluate the outcomes. This process happens relatively more automatically or deliberately, depending on the nature of the social interaction that can be described as more rote (scripted) or novel, respectively. Two essential and interrelated aspects of SIP involve cognitions and emotions. Effective SIP requires awareness and accurate interpretation of one's own and other's cognitions about the current exchange, including goals and intentions. Effective SIP also requires that the individual notice and consider other stakeholders' current emotional states and potential reactions when selecting, enacting, and evaluating a response. Moreover, each aspect of SIP is influenced by the individual's emotions and his or her ability to regulate them, as the intensity of experienced emotion influences what is noticed about the context, as well as the type of goal that is selected (i.e., a goal targeted to provide immediate emotional relief versus a goal targeted at long term positive outcomes).

A comprehensive framework of social competence. Rose-Krasnor's (1997) three-level Social Competence Prism situates SIP within a framework that specifically focuses on the conceptualization and measurement of SC. The highest level of the prism

comprises a theoretical conceptualization of SC as effective social interactions resulting from organized behaviors that meet the individual's short and long-term needs. SC is identified as transactional and context dependent as it emerges from social *interactions* that may be successful in one situation but not another. The Index level represents specific age and context appropriate outcomes that can be judged as socially competent or not, such as quality of friendships. Outcomes are judged as successful when a balance is maintained between the goals of the individual (Self Domain) and those around them (Other Domain). Self-Domain Indices reflect effectiveness from the individual's own perspective, such as perceived social effectiveness and social self-efficacy. Other-Domain indices include sociometric status, quality of friendships, and quality of social support networks. The third level comprises skills that form the foundation of social competence. This level includes specific skills as well as goals and values that provide motivation for social behavior. Whereas SC outcomes can be measured more globally at the Index level by judging the success of specific outcomes, interventions and assessment should be targeted at the Skills level. Interventions should be based on training skills and motivational characteristics, both involving SIP, linked to the selected competence indices (Rose-Krasnor, 1997).

Social skills are specific behaviors exhibited in specific situations that lead to judgments by others that these behaviors were competent or incompetent in accomplishing specific social tasks (Gresham & Elliott, 2008). Drawing on developmental task theory (Masten et al., 1995; Sroufe, 1979), social skills are enacted to successfully complete social tasks such as peer group entry or conflict resolution. When put in the framework of Rose-Krasnor's (1997) SC prism, several of these social tasks

would contribute to social success at the Index level. For example, a child would need to navigate social tasks such as peer group entry, initiating and sustaining a conversation, and playing cooperatively with peers, in order to be judged as successful on the age appropriate index of “friendship success.”

Temperament

Children’s development of Social Competence (SC) is linked to individual temperamental traits, both in theory (e.g., Rothbart et al., 1994) and in research (e.g., Blair et al., 2004). Temperament refers to biologically based and genetically influenced traits that inform a child’s level of reactivity and self-regulation as displayed in emotions, attention, and activity (Rothbart & Bates, 1998). Much of temperament definitions and research focus on ways in which individuals are inclined to respond to relatively new or unfamiliar stimuli (i.e., events, settings, or exchanges; see Appendix A for an overview of definitions). Factor analyses have identified three broad temperamental factors, namely negative emotionality, surgency/ extraversion, and effortful control. Traits are known to be relatively stable across situations and time, serving as the basis for later personality development (e.g., Putnam & Rothbart, 2006). Negative emotionality and surgency/ extraversion describe compositions of traits referring to tendencies to react more intensely and immediately to environmental changes with negative and positive emotions, respectively. In contrast, effortful control consists of a number of traits that allow a child to regulate emotions, attention, and activity in order to focus attention, perceive their surroundings more sensitively, and inhibit responses to external stimuli. The numerous links between temperament and SC are documented elsewhere in this review (See Social Competence & Temperament).

Rothbart's developmental framework of temperament. Rothbart defines temperament as part of the broader domain of individual differences in personality, mainly concerning primarily biologically based individual differences in reactivity and self-regulation (Rothbart, 2011). Reactivity refers to disposition to emotional, motor, and attentional reactions. This can be measured through latency, intensity, peak intensity of reaction, and recovery of the reaction. Self-regulation refers to how this reactivity is regulated, including the tendency to approach or withdraw from a stimulus, and to direct attention to or away from it. It also includes the ability to control actions and emotions (effortful control). Behaviorally, temperament can be observed at all ages as individual differences of emotionality, activity, and attention. Phenomenologically, it is experienced as feelings of energy, interest, and affect.

Temperament traits are observable early in life and form the earliest individual differences in personality (Rothbart, 2011; Derryberry & Rothbart, 1984). Temperament has been described as the underlying core of personality, comprised of emotionality, activity level, and attention characteristics among others, whereas personality is seen as a broader domain of characteristics, most requiring more mature cognitive functioning, including values, beliefs, and attitudes (Rothbart & Bates, 2006). Personality also includes perceptual and response strategies. These personality structures and strategies develop through maturation and interactions with environment. Thus, the relations between temperament, behavior, and experience becomes more complex as the child develops; it is also influenced by various other factors such as motivation, knowledge structures, and expectations. Notably, evidence illustrating the overlap between temperament and personality factors (five factor theory of personality) in children as

young as preschoolers bring into question whether two distinct models of temperament and personality are even necessary. Specifically, temperamental Surgency is represented by the personality trait of Extraversion; Negative Affectivity by Neuroticism; and Effortful Control by Conscientiousness (Grist & McCord, 2010).

Development. Typical newborns show varying states of arousal and emotion, as well as important temperamental differences in orienting, irritability and activity, distress proneness, and soothability (Rothbart, 2011; Strauss & Rourke, 1978). Greater orienting, or attentional control, has been associated with lower distress in infants (Harman et al., 1997) and lower negative emotionality up to adulthood (Derryberry & Rothbart, 1988; Rothbart & Sheese, 2007). By 2-3 months, a behavioral shift takes place where increases in positive affect, approach and surgency and frustration, are observed (Rothbart 1986, 2011). During the first 6 months of age, developmental transitions of autonomic components like the extent and direction of heart rate change take place, after which the onset of behavioral inhibition is observed in the latter half of the first year of life. This behavioral inhibition is marked by approach or avoidance of novel stimuli and continues to increase during the preschool period. Notably, some temperament characteristics may not be present at birth but emerge later in childhood, and, while there is a degree of stability to many basic temperaments, they also change with development and in response to experience (Rothbart & Bates, 2006).

Measurement of temperament. Temperament is most often measured with questionnaires filled out by caregivers, self-report, naturalistic observations, mechanical measures assessing movement and activity, structured observations and cognitive tasks in a lab. Rating scales are particularly useful as they make use of raters' repeated

observations over time in naturalistic settings and can therefore capture a large number of traits that are stable over time (Rothbart, 2011). One of the most widely used and researched parent questionnaires of temperament is the Child Behavior Questionnaire (CBQ; Rothbart et al., 1994; Rothbart et al., 2001) and its corresponding short form (CBQ-SF; Putnam & Rothbart, 2006). These measures are considered comprehensive as they include both the reactive and self-regulatory aspects of temperament. The CBQ measures the domains of Activity Level, Anger/Frustration, Approach/Positive Anticipation, Attentional Control, Discomfort, Falling Reactivity/ Soothability, Fear, High Intensity Pleasure, Impulsivity, Inhibitory Control, Low Intensity Pleasure, Perceptual Sensitivity, Sadness, Smiling and Laughter, and Shyness. Factor analysis of the CBQ has consistently yielded three broad factors (e.g., Ahadi et al., 1993; Kochanska et al., 1994; Goldsmith et al., 1997; Rothbart et al., 1994; Rothbart et al., 2001) that relate to varying degrees to three of the Big five personality dimensions (Digman, 1990; Goldberg, 1990), namely Surgency/ Extraversion, Negative Affectivity, and Effortful Control.

Surgency/ Extraversion (SE) refers to activity levels, positive emotionality and impulsive behaviors. Theoretically, SE encompasses reactive traits that are driven by energetic, positive emotionality. In US samples, SE is characterized by high positive loadings on the Approach (Amount of excitement and positive anticipation for expected pleasurable activities), Impulsivity (Speed of response initiation), High Intensity Pleasure (Amount of pleasure or enjoyment related to situations involving high stimulus intensity, rate, complexity, novelty and incongruity), and Activity Level (Level of gross motor activity including rate and extent of locomotion) scales and strong negative loadings on

the Shyness scale (Slow or inhibited approach in situations involving novelty or uncertainty; Putnam & Rothbart, 2006).

Negative Affectivity (NA) refers to reactive traits that are driven by strong negative emotions. This factor has high positive loadings on Sadness (Amount of negative affect and lowered mood and energy related to exposure to suffering, disappointment and object loss), Fear (Amount of negative affect, including unease, worry or nervousness related to anticipated pain or distress and/or potentially threatening situations), Anger/Frustration (Amount of negative affect related to interruption of ongoing tasks or goal blocking), and Discomfort (Amount of negative affect related to sensory qualities of stimulation, including intensity, rate or complexity of light, movement, sound, texture) and negative loadings for Falling Reactivity/ Soothability (Rate of recovery from peak distress, excitement, or general arousal; Putnam & Rothbart, 2006).

Effortful Control (EC) includes regulatory aspects of temperament. EC incorporates self-control and attentional characteristics and contains high positive loadings for Inhibitory Control (the capacity to plan and to suppress inappropriate approach responses under instructions or in novel or uncertain situations), Attentional Focusing (Tendency to maintain attentional focus upon task-related channels), Low Intensity Pleasure (Amount of pleasure or enjoyment related to situations involving low stimulus intensity, rate, complexity, novelty and incongruity), and Perceptual Sensitivity (amount of detection of slight, low-intensity stimuli from the external environment) scales.

Social Competence & Temperament

Links between temperament and SC are widely documented (e.g., Putnam & Rothbart, 2006; Zhou et al., 2010). The way in which children experience and regulate emotions is crucial to social exchanges. Emotions function as both motivators and organizers of behavior that subsequently influence social interactions (and facilitate social relationships) through initiating and guiding social exchanges, communicating valuable information for understanding social interactions, and sharing emotional experiences (Sroufe et al., 1985). Furthermore, differences in how individuals experience emotions (i.e., valence, intensity, and duration) influence and bias children's reactions and learning in social situations and affects their tendencies to approach or withdraw from others (Rothbart et al., 1994). From a SIP perspective, certain reactive temperamental traits lead to inflexible emotion responses that may make young children less available to encode, interpret, react appropriately, and learn from, social interactions (Lemerise & Arsenio, 2000). In contrast, certain regulatory traits enable children to sustain attention and notice subtle social cues that enable them to modulate their behaviors to adapt to peer interactions (Acar et al., 2015; Cutting & Dunn, 2002). Therefore, the current study focuses on the two domains of temperament that focus on regulatory traits, as well as negative emotionally reactive traits. For the sake of comprehensiveness, information related to SC and positive reactive traits can be found in Appendix B. Theoretical and empirical links between select temperamental traits and social outcomes are summarized in the following section (more details regarding the cited studies are in Appendices C - F).

Notably, several factors make it challenging to identify consistent patterns among studies. First, studies have used a variety of social outcome measures including parent and teacher social skills ratings, peer likeability ratings, and laboratory observations of prosocial behaviors (see Appendix H). Others have focused on maladaptive social behaviors instead, such as aggression or more broadly defined “externalizing behaviors” (see Appendices D and F). Whereas the majority of the cited studies used the CBQ measure for temperament (with some using other similar scales or laboratory observations), most report findings only based on broad temperamental composites (i.e., negative/ positive reactivity and surgency) with few reporting domain specific findings. This makes it challenging to identify which particular traits play a more substantial role in SC outcomes. Another dramatic influencing factor is the use of different rating scale informants and the discrepancies identified when using multiple informants. In fact, findings across the field of psychology consistently yield low agreement in ratings that observe children in different settings (e.g., home and school; De Los Reyes & Kazdin, 2005). These differences provide unique insights into individuals’ functioning across settings with varying performance expectations (Annotti & Teglasi, 2017), yet pose a challenge when studies use different raters for dependent and outcome variables (e.g., Teglasi et al., 2015; Zhou et al., 2010).

Social competence and negative reactivity. Negative reactivity refers to general patterns of overreaction to stimuli with subsequent high arousal. Children with high negative reactivity become easily frustrated, which can lead to a pattern of anger, irritability, or aggression (Rothbart, 2011). Negative reactivity is generally thought to be a predictor of socially incompetent behavior (Oldehinkel et al., 2004; Rothbart, 2011;

Sanson et al., 2004). Viewed through a SIP lens, children high in NR frequently experience intense negative emotions that influence what is noticed and the meaning attributed to a social situation (Crick & Dodge; Lemerise and Arsenio, 2000). Thus, strong negative affect can impair the ability to effectively interpret and adapt to challenging social situations (Dodge & Somberg, 1987). In fact, there is evidence that individuals' emotional experiences might bias their attention towards information that is consistent with their own experienced emotions (Stewart et al., 2010; Tamir & Robinson, 2007). As an example, one study illustrated that children who were induced to experience negative emotions were more likely to attend to negative emotional stimuli than were children who were not induced to have negative emotions (Kujawa et al., 2011). Children high in NR likely act in order to relieve immediate distress, rather than choosing longer term goals targeted at maintaining positive social relationships (Lemerise and Arsenio, 2000). They may react aggressively, or habitually withdraw from interactions, thereby missing out on social learning opportunities. Moreover, children who have difficulty differentiating their own negative emotions and the emotional reactions of others' more often interpret others' intent as hostile when experiencing a negative consequence (i.e., hostile attribution bias; for example, interpreting an accidental shove as confrontational; Crick & Dodge, 1994; Dodge, 2006). Notably, there are differences in correlates between the externalizing (anger, frustration) and internalizing (sadness, fear) negative reactivity traits and behavior outcomes. Relations between negative reactivity and social competence are summarized in Appendix C.

Anger/ Frustration. Relations between Anger / Frustration and behavior outcomes are some of the most researched, and most robust, compared to other temperamental traits

(e.g., Rothbart et al., 2000). Children who experience intense anger may have difficulty developing appropriate social skills because they become too emotionally aroused to gain accurate information from their social environment (e.g., Pope & Bierman, 1999; Rydell et al., 2007). Accordingly, consistent negative associations have been identified between anger/ frustration and SC, particularly for boys (see Appendix C). Moreover, positive relations between Anger/ Frustration and peer problems (including aggression and externalizing problems) are relatively robust (see Appendix D).

Fear. Fear is a negative emotion related to anticipated pain, distress, and/or threat, including startle reactions to novelty and social stimuli (Gartstein, Putnam, & Rothbart, 2012). The SIP of children with high levels of temperamental fear may be affected as they over-focus on threat-related emotional stimuli, as illustrated in a study examining the overlapping construct of trait anxiety where anxious children were more likely to attend to angry facial expressions than their non-anxious peers (Muris et al., 2004). However, relations between fear and SC appear to be complex and is rarely studied in isolation. Direct relations between fear and SC appear to be inconsistent (ranging from nonsignificant to moderate negative) and patterns are difficult to distinguish given the methodological challenges stated above. Some have proposed that fearful children may be more likely to elicit prosocial behavior from others (Coplan & Bullock, 2012; Jenkins & Ball, 2000) thereby increasing social opportunities. Others have noted that fearful children who are also inhibited are often not liked by peers (Rubin, Bukowski, & Parker, 2006) and can have low levels of social competence (Sprinrad et al., 2004). Finally, it is worth noting that fearfulness has been consistently linked to internalizing problems

(Eisenberg et al., 2001; Oldehinkel et al, 2004) and social anxiety (Schwartz, Snidman, & Kagan, 1999).

Sadness. Children with high levels of temperamental sadness tend to become upset or discouraged easily when something does not go their way. Such personal distress has been linked to failure to respond sympathetically (i.e., in a socially competent manner) as the emotional distress makes children self-focused (Hubbard & Coie, 1994). In other words, children need to be able to regulate sadness appropriately to be other-oriented, which is key for SIP and subsequent SC. Relations between Sadness and SC are typically negative and moderate in size, however some found positive associations (Rothbart et al., 1994).

Discomfort. Discomfort refers to the amount of negative affect a child displays related sensory input, such as pain or uncomfortable temperatures (Putnam et al., 2006). In one identified study that reported relations between Discomfort and SC, significant negative associations were found between the two constructs when informants were matched on both measure (i.e., teacher or parent; see Appendix C).

Falling Reactivity/ Soothability. Soothability refers to the rate of a child's recovery from peak distress or arousal. Although it is a regulatory trait, it is often included in negative reactivity composite scores (e.g., CBQ; Putnam & Rothbart, 2006) as *low* soothability. Conceptually, children who are able to quickly regulate their negative emotions after a setback would be more available to engage in exchanges and process social information accurately (Lemerise & Arsenio, 2000). *High* levels of Soothability have been associated with greater SC (See Appendices C and E).

Social competence & regulatory traits. Regulatory temperamental traits, also referred to as effortful control, are most consistently associated with positive social outcomes (Eisenberg, Smith, & Spinrad, 2011). Children with high EC are able use attentional control and other coping strategies to monitor and adjust their behavior (Olson et al., 2005). As such, it makes sense that children high in RT are able to regulate their own emotions to the extent that is necessary to attend to and accurately interpret social cues. Moreover, they are in a better position to engage in effortful processing and select responses that match social goals, such as building or maintaining positive relationships (Lemerise & Arsenio, 2000). Studies typically use an effortful control composite when examining relations with SC, with few considering individual domains (see Appendix E). For example, Olson, Choe and Sameroff (2017) found that effortful control strongly differentiated preschoolers' developmental trajectories regarding externalizing behaviors (i.e., problematic social behaviors) where a one-unit increase in EC during the preschool years was associated with 40:1 odds of following a low vs. chronic externalizing trajectory from age 3 to 10 years old. Relations between regulation and social competence are summarized in Appendix E.

Inhibitory Control. Inhibitory control plays a key role in SC as it relates to the capacity to plan and to suppress inappropriate approach responses upon request or in novel or uncertain situations. Children purposefully inhibit responses to attain goals such as preserving friendships. For example, children will attempt to hide negative expressions when receiving an undesirable gift, although this skill rapidly improves in the preschool and early elementary years (Saarni, 1984). Inhibitory control plays a key role in SC skills such as cooperation and responsibility as it includes the tendency to react appropriately to

stop doing something upon request, or to wait one's turn. Correlations between Inhibitory Control and SC tend to be positive and moderate to large.

Attention Focusing allows a child to maintain focus on and complete the task at hand while ignoring potential distractions. Attentional focusing plays a key role in SIP (Crick & Dodge, 1994; Rudasill & Konold, 2008) as it allows the child to maintain focus on noticing, interpreting, and acting upon, social information. Unsurprisingly, the literature shows consistent, positive, moderate to large associations between Attention Focusing and SC.

Perceptual Sensitivity. Perceptual sensitivity refers to the extent to which an individual notices slight, low intensity, stimuli from their environment. This trait seems to be understudied in relation to SC, however it may play a role in effective encoding and evaluation of actions within SIP.

Low Intensity Pleasure. Low intensity pleasure refers to the enjoyment of low-level stimulation including activities like listening to nursery rhymes and looking at picture books. This trait may enhance socially competent behavior, particularly in routine situations, as it enables the child to pay attention to everyday stimuli. Low intensity pleasure appears to be positively related to SC when informants are matched (Teglasi et al., 2015).

Reactivity, regulation, and social competence. The findings above highlight strong associations between EC and SC, however links between negative reactivity are somewhat inconsistent for NA traits. Thus, it is useful to examine how NA links to SC when combined with regulatory traits as these may serve as a protective factor for children with high NA. EC has been identified as a moderator of the relation between

children's observed and parent rated NA (fear and frustration) and their SC and behavior problems (Moran, Lengua, & Zalewski, 2013). The interaction between EC and NA helps to shed light on some of the inconsistencies identified between NA traits and behavior outcomes. For example, in some studies higher fear has been associated with lower externalizing problems (Rothbart et al., 2011), potentially acting as an inhibitor for inappropriate behavior. However, when paired with low EC, high fear has been associated with poor social outcomes (Moran et al., 2013). Whereas anger/frustration is typically associated with poor social outcomes, these relations weaken or diminish when paired with high EC (Moran et al., 2013; Eisenberg et al., 2000) and become stronger when paired with low EC (Orta et al., 2013; Kim & Cicchetti, 2010). These results suggest that sufficiently strong regulatory abilities are critical for children who are prone to experiencing strong negative emotions; it allows them to modulate the intensity of emotional arousal and to select emotional responses that enable them to function effectively by not violating contextual demands and expectations (Orta et al., 2013; Eisenberg & Fabes, 2006).

Theory of Mind

Whereas temperamental traits may influence patterns of exchanges and what is noticed about the social environment, socially competent behavior also relies on the accurate or appropriate *interpretations* of what is noticed (i.e., social cues). The ability to interpret cues often involves Theory of Mind (ToM). ToM refers to the ability to differentiate reality from internal mental states (beliefs, desires, intentions, and emotions), to represent those mental states, and to acknowledge that behavior is driven by mental states, and not by reality (Astington & Jenkins, 1995; Hughes & Leekam, 2004;

Fink, et al., 2014). Although there are varying views on the development of ToM (each influenced by the ways in which ToM is defined and measured) it is generally agreed upon that 3-6-year-olds are able to verbalize ToM understanding to varying degrees of complexity or success (Westby & Robinson, 2014; See Appendix G for a review of ToM development). ToM in young children is most often studied as a unitary construct where an operational definition was based on assessment tasks measuring False Belief (FB) understanding (the realization that beliefs are representations of reality, and therefore can be mistaken; Wimmer & Perner, 1983). More recently, based on information gathered from neuroimaging studies, several other dimensions of ToM have been identified such as appearance-reality distinction and differentiating between diverse desires (AbuAkel & Shamay-Tsoory, 2011; Frith & Frith, 2003; Northoff et al., 2006; Shamay-Tsoory, 2011), yet combined they capture only a part of how the construct is defined.

ToM measurement. Typically, ToM is measured with tasks that set clear expectations for correct responses, with instructions that include all relevant information about what is known to each person in order to distinguish what is real from what is believed (e.g., Wellman & Liu, 2004). Below follows a short description of widely used ToM measures in order to illustrate this more clearly:

False Belief Task: The false belief (FB) task has become nearly synonymous with ToM measurement in younger children (e.g., Hughes et al., 2005; Fink et al., 2014; Lalonde & Chandler, 1995; Weimer & Gasquoine, 2016). Generally, a FB task provides a vignette-based situation where the child is given information about what a character has seen, and therefore believes, and is then asked to predict what that character will think or do (e.g., NEPSY-II, Korkman, Kirk, & Kemp, 2007).

Diverse Desires Task: The task proposes to measure a child's capacity to judge that two persons have different desires about the same objects. For example, after obtaining information about the child's desire, and providing information about a character's deliberately discrepant desire, the examiner asks the child to predict how a character would react (typically forced choice response options) when they receive the undesired object (Wellman & Liu, 2004).

Diverse Belief Task. This task measures a child's ability to judge that s/he has different beliefs than someone else about the same object, without knowing which is correct. For example, after showing a child a picture and asking where s/he thinks an object is hidden (location A), s/he is told that the character thinks it is hidden somewhere else (location B). The child is then asked where the character will look for the object first (Wellman & Liu, 2004).

Knowledge Access Task. This task is stated to measure a child's ability to differentiate their own knowledge from another person. For example, a child is asked to look inside a box and told that a character has not looked inside the box. S/he is then asked whether the character knows what is inside the box (Wellman & Liu, 2004).

Real-Apparent Emotion Task. This task requires a child to judge that a person can express an emotion that is different from what is truly felt. For example, the child is told that a character was being teased while onlookers laughed and that the character did not want the others to know how he really felt. The child is then asked to point to one of three emotion pictures to indicate how the character really felt and what feeling he tried to show on his face (Wellman & Liu, 2004).

Belief-Emotion Task. This task requires a child to judge how another will feel, given that person's false belief. For example, a child is told that a character loves a certain snack and believes that it is located in a box, but that the box actually contains rocks. The child is then asked how the character feels when he receives the box – happy or sad.

Appearance-Reality task. The task requires a child to distinguish between appearance and reality. For example, the child is shown a box that is shaped like a book and asked to identify the object (Korkman et al., 2007)

These widely used ToM measures only capture one key phenomenon of ToM, which is the *ability* to distinguish between perception (e.g., belief, desire, feeling) and reality when information is available about both. These tasks measure children's ability to access knowledge about others' thoughts, yet they have limited social context. A growing body of research acknowledges the importance of context when processing social information, such as nature of relationships and related moral judgements. For example, preschoolers are more likely to label intentionality behind name calling as “a game” when it is between two friends, but as “acting mean” when it is between children who are not friends (Slomkowski & Killen, 1992). Relatedly, morally relevant ToM refers to the intersection of mental state knowledge and moral judgement, where the intentions attributed to an individual depends on moral judgements regarding their behavior (Killen et al., 2011). This can be measured with vignettes or stories about unintentional and intentional transgressions between two child characters (Killen et al., 2011; D'Esterre et al., 2019). Participants are then asked a series of questions regarding their moral assessment of the behavior as well as theory of mind questions regarding their

own and each character's beliefs about the situation. Morally relevant and context specific ToM adds important nuances to ToM measurement that are not captured with knowledge-based ToM tasks. Importantly, as with false belief and appearance – reality distinction ToM tasks described above, these vignettes explicitly provide all the necessary information to participants to form an appropriate moral judgement and draw conclusions about beliefs.

Success on these ToM tasks may not provide the needed insight into children's actual preparedness to meet the full range of SIP requirements for social success in real world, ambiguous exchanges where little information is made explicit (Annotti & Teglasi, 2017) and children have to go beyond just distinguishing between reality and perception to actually infer what others may be thinking or feeling. This line of reasoning is consistent with the fact that 2-3-year-olds seem to engage in sophisticated peer exchanges, suggesting some understanding of mental states, yet they frequently fail these ToM tasks (Dunn et al., 1991; Wimmer & Perner, 1983; Rieffe et al., 2000). This may help to shed light on the inconsistencies between ToM and SC relations discussed later in this chapter.

Theory of Mind and Social Competence

ToM is theoretically regarded as a prerequisite component of social competence (Denham et al., 2003; Imuta et al, 2016; Ornaghi et al., 2014). The ability to obtain information about beliefs, desires and intentions from the social environment plays a central role in navigating social interactions (e.g., Buck, 1975; Astington & Edward, 2010). Successful navigation of social exchanges depends on the ability to consider and coordinate the self and others' perspectives during each "step" of SIP (Schultz et al.,

1989). Typically developing children that use ToM when processing social information are also more likely to identify problems accurately and subsequently generate and enact socially adequate responses (Russo-Ponsaran et al., 2015; Mazza et al., 2017). Children with greater ToM abilities (among other cognitive abilities including executive functioning) are thought to be better able to adapt to novel situations, understand the perspectives of others, and inhibit maladaptive behaviors (Anderson, 2008; Astington, 2003). Consequently, children with greater ToM abilities typically demonstrate more prosocial behavior, are accepted by peers, and are less aggressive than their peers (Gini, 2006; Gomes & Livesey, 2008; Masten et al., 2012)

Consistent with the theoretical link between ToM and social competence, relations between children's ToM and SC are relatively robust, however they are small to moderate (Cassidy et al., 2003; Lalonde & Chandler, 1995; Imuta et al., 2016). In a recent meta-analysis, authors found an overall significant association of $r = .19$ between ToM and prosocial behavior (defined as helping, comforting, sharing and/or cooperating) in 6,432 2-12-year-olds across 76 studies. Another systematic review yielded an overall relation of $r = .23$ between young children's ToM and peer acceptance with a stronger relation for girls ($r = .30$) than boys ($r = .12$; Slaughter et al., 2015). As mentioned before, measurement of ToM in young children typically rely on access to social, rather than personal, schemas and may not reflect the type of SIP needed for ambiguous social exchanges. Appendix H provides an overview of studies examining associations between ToM and SC. For each study, the ToM measure(s) are described in terms of the task demands and response expectations. It is evident that the vast majority of research

from the past 30 years uses standardized, highly structured tasks that require the child to distinguish between reality (truth) and a specific, predetermined perception.

Associations between ToM and SC are further muddled by differing approaches to SC measurement. SC is most frequently measured with rating scales where caregivers who know a child well rate items that describe prosocial behaviors, or social skills (Gresham, Elliott, Vance, & Cook., 2011). Social skills rating scales are indirect measures of behavior that require the rater to retrospectively rate the occurrence of behavior (Gresham & Lambros, 1998). These rating scales are advantageous as they provide information that can be quantified and therefore subjected to reliability and validity analyses. They also allow for a broad range assessment of behavior from multiple raters (e.g., parents, teachers, and students) within a short period of time. Furthermore, they provide normative data that can serve as a standard for judging the severity of the behavior against representative samples of same age peers (Gresham & Elliott, 2008; McConaughy & Ritter, 2002). Despite these advantages of behavior rating scales, a long-standing problem and topic of research is the robust finding of low to moderate agreement (Pearson r of .20 or less) between different ratings of social, emotional, and behavioral problems (Achenbach, McConaughy, & Howell, 1987; De Los Reyes & Kazdin, 2004; Renk & Phares, 2004). The vast majority of studies examining children's SC and ToM use teacher raters (e.g., Cassidy et al., 2003; Lalonde & Chandler, 1995; Korucu et al., 2016; Izard et al., 2001). Studies that include parent ratings typically find weaker associations between ToM and SC (e.g., Weimer and Guarjardo, 2005; Veiga et al., 2016).

Temperament and Theory of Mind

In contrast to the breadth of research covering associations between ToM and SC, fewer studies have examined links between ToM and temperament. Interest in links between temperament and ToM emerged from a body of research finding clear associations between environmental factors such as family background (Cutting & Dunn, 1999) and cultural variables (Vinden, 1999) and individual differences in ToM. However, these studies overlooked the fact that environmental influence on individual characteristics often covary with genetic effects. The first known study to examine genetic effects on ToM ability tested 120 pairs of 3-year-old twins and found an estimated heritability of 67% for this sample, indicating that the remaining 33% of the variance in ToM performance was accounted for by non-shared environmental influences (i.e., environmental factors that have child-specific effects; Hughes & Cutting, 1999). Given the biological nature of temperamental disposition, it makes sense to examine its role in the development of ToM. Temperament dimensions influence children's approach to and participation in social interactive experiences which reflect and impact children's social understanding (Rothbart & Bates, 1998; Wellman et al., 2011). Therefore, researchers have more recently explored the possibility that individual differences in temperament might substantially impact ToM development in early childhood.

Links between temperament and ToM have been studied through both biologically-based and experience-based lenses. One line of research has informed the evolutionary perspective on how biologically based dispositions, considered to be temperament, contribute to social cognition. Stemming from research examining

temperamental and social cognitive differences in wolves and dogs, as an explanation for the domestication of dogs, the emotion-reactivity hypothesis proposes that a less reactive temperament might facilitate the development of social-cognition in human children, as calm individuals (i.e., those with low anger, fear, and discomfort) are better suited to spend time around others and attend to their social cues (e.g., Lane et al., 2013; Wellman et al., 2011). On the other hand, the emergence account highlights the role of experience as influenced by temperament. Specifically, the emergence account (Russell, 1996) suggests that regulatory traits such as inhibitory control are necessary in order to develop ToM as children must have some capacity to distance themselves mentally from what they know about the current state of affairs in order to develop an understanding of another person's perspective. Taken together, these accounts propose that regulatory traits enable social attentiveness and eventual development of ToM, whereas negative reactive traits may hinder the child's exposure to, and emotional availability for, social learning. A combination of high regulatory and low emotional reactivity traits may therefore produce a calm and socially observant temperament that is optimal for social cognitive development. Notably, some studies have focused on the temperamental trait of behavioral inhibition or shyness and its links with ToM, with varied results (e.g., Longobardi et al., 2017; Pecora et al 2017). Shyness is a complex construct that likely interacts with a multitude of factors to enable or inhibit social cognition (e.g., Rubin et al., 2014). The current study focuses specifically on the regulatory and reactive traits that seem to have more straightforward relations with individuality and social cognition as discussed in the sections below.

Regulatory traits and ToM. Studies examining global regulatory temperament (usually measured with an effortful control composite; EC) using the emergence framework yield inconsistent relations with classic ToM tasks (see Appendix I). For instance, Carlson and colleagues (2002) found no relation between parent-rated EC and children's performance on a battery of ToM tasks measured at age 2 and again at age 3. In contrast, Blair and Razza (2007) identified a moderate relation between three-year-olds' parent-rated EC and their performance on standard FB tasks ($r = .41$, $P < .01$). Following below is a review of specific components of EC and their relations to ToM.

Attentional Control/ Focusing. All identified relations between attentional control and standard FB tasks were nonsignificant (see Table 8). Two identified studies used different ToM measures and found positive relations: One study used Denham's puppet task (Denham, 1986; see Appendix H for task description) and found that two-to-three-year-olds' perspective taking was significantly associated with attention focusing ($r = .45$, $p < .01$; LaBounty et al., 2016). Longobardi and colleagues used the TEC (see Appendix H for task description) and found similar positive relations among three-to-four-year-olds. Both of these tasks are designed to measure a wider range of perspective taking abilities, including the ability to infer a character's desire or emotions that differ from those of the participant.

Inhibitory Control. Although a number of studies have shown robust correlations between ToM and performance based inhibitory control during the preschool age (e.g., Bellagamba et al. 2015; Carlson and Moses 2001; Chasiotis et al. 2006), few have examined these relations using temperament-based measures of inhibitory control. This distinction is important, as performance-based measures capture maximal abilities under

controlled conditions, whereas temperament measures provide an estimate of a child's disposition under typical conditions and therefore more closely reflect how this type of self-regulation might affect acquisition of ToM over time. (See the following for a review of maximal and typical performance expectations: Cronbach, 1960; Goff, & Ackerman, 1992; Sackett, 2007). Relations between temperamental inhibitory control and ToM appear to be inconsistent, ranging from nonsignificant (Mink et al., 2014; Carlson & Moses, 2001; LaBounty et al., 2016) to significant and moderate in effect size ($r = .31 - .43$; Pecora et al., 2017; Carlson & Moses, 2001; LaBounty et al., 2016) depending on the nature of performance and temperament measures used. Notably, all these studies were conducted with three-to-four-year-olds.

Perceptual Sensitivity. Despite the compelling conceptual link between perceptual sensitivity and ToM, few studies have examined direct relations between the two. Wellman and colleagues (2011) found that 3.5-year-olds' parent-rated perceptual sensitivity positively predicted performance on standard FB tasks at age 5.5 ($r = .19$, $p < .05$). One other study was identified where a "socially observant temperament" was measured through behavior observation in 10-12-month olds. This variable failed to predict FB task performance at age four, however power was limited due to a small sample size (see Appendix I; Brink et al., 2015).

Low Intensity Pleasure. One identified study examined relations between Low Intensity Pleasure and ToM. LaBounty and colleagues (2016) identified a moderate association between 3-4-year-olds' parent rated Low Intensity Pleasure with performance on Denham's puppet-based ToM task ($r = .39$, $p < .05$), but the relation with standard FB tasks was non-significant.

Negative reactive traits and ToM. The small number of studies that have direct links between broad negative reactivity and ToM have failed to find significant associations (see Appendix J). In fact, the few reported relations between anger and fearfulness and ToM are also nonsignificant, and no studies were found to have examined sadness, discomfort, or soothability.

Trait combinations and ToM. Few authors have examined how combinations of regulatory and reactive traits link to ToM. As explained previously, EC has been identified as a moderator of relations between NA with SC (Moran et al., 2013) and likely plays a similar role when examining associations between temperament and ToM. Theoretically, *high* EC may enable a highly reactive individual to regulate their emotions in order to engage in effective SIP, whereas a reactive individual with *low* EC may focus on alleviating their immediate despair instead of acting in ways that meet long term social goals (e.g., inhibiting an angry response to maintain a relationship). No studies were identified that studied links between ToM and combinations of NA and EC, however a small number of studies did examine combinations of reactive traits and behavioral inhibition or shyness. Wellman and colleagues (2011) found that a combination of 3-year-olds' parent-rated lack of aggressiveness (Child Behavior Checklist; CBCL; Achenbach, 1992), paired with shyness and perceptual sensitivity (CBQ), predicted performance on standard FB tasks at age 5 ($R^2 = .11$), whereas nonsocial temperamental traits (attentional focusing and activity level) did not. The authors concluded that nonaggressive but additionally shy-withdrawn and perceptually sensitive 3-year-olds tend to achieve more advanced FB understandings by the time they are 5. In a cross-cultural study, Chinese and US children who were more aggressive (parent rated CBCL) as well

as socially withdrawn (CBCL) and more physiologically reactive (measured via salivary HPA-Axis reactivity) performed poorly on standard FB tasks (Lane et al., 2013). The authors of these two studies concluded that their results supported the emotional reactivity hypothesis that nonaggressive, observant temperaments predicted ToM abilities. Notably, both of these studies used the Child Behavior Checklist as a measure of aggression where raters indicate the frequency of aggressive behaviors occurring. This subscale is designed to measure externalizing behaviors, yet both studies used it as a measure of temperament. The overlap between temperamental regulation and reactivity and externalizing behaviors has been studied previously and while they are certainly related, they are widely understood to be theoretically distinct constructs (Olson et al., 2017; Lemery, Essex, & Smider, 2002; Lengua, West, & Sandler, 1998).

Theory of Mind, Temperament, and Social Competence

Research examining links between ToM, temperament, and SC in concert is limited. In a sample of Turkish preschoolers, performance on standard ToM tasks failed to mediate relations between parent rated EC and teacher rated SC (Korucu et al., 2016). These findings are unsurprising, given the use of different informants to measure EC and SC (De Los Reyes & Kazdin, 2005). In another study, FB task performance at three-years-old did not differentiate trajectory classes of (parent-rated) externalizing behavior between the ages of three to ten-years old when controlling for the effects of parent-rated EC (Olson et al., 2017). Based on their hierarchical model, authors concluded that low EC was the primary contributor to behavior problems, subsuming the effects of ToM and other control variables (IQ and parenting variables). However, these conclusions are limited by the methodological approach as they did not explore interaction effects

between temperament variables (specifically reactivity), nor did they use ToM measures beyond standard FB tasks. In a cross-cultural study with US and Chinese preschool children, Lane and colleagues (2013) found that children who were better able to understand others' false beliefs were rated as less aggressive by their parents. However, when both withdrawal and physiological reactivity were high, children showed poor FB understanding. Finally, Song and colleagues (2016) examined parent reported callous and unemotional traits in three-year-olds and found that these traits only predicted higher levels of teacher-rated externalizing behavior in children with low ToM and a low fearful/inhibited temperament.

Age Group

Across the preschool years, children show dramatic increases in their ability to regulate behavior (Shonkoff & Phillips, 2000), internalize social norms (Kochanska & Aksan, 2006), and develop an awareness of others' mental states (Wellman, 2014). By the end of the preschool period, these core developmental milestones help to reduce the normative high levels of problematic peer interactions such as aggression that are typically shown by children from ages 2 to 4 years old (Hay, Payne, & Chadwick, 2004). However, some children show persisting behavior problems beyond the preschool period to the middle- and late-childhood period (NICHD Early Child Care Research Network, 2004). These children have been shown to have a wide range of adjustment problems in both social and academic domains across the school-age years (Caspi & Moffitt, 1995; Dodge, Greenberg, & Malone, 2008; Morrow et al., 2006). Compared to the 3-to-4-year-old range, the 5-6-year-old age group is more useful to investigate, as variability in ToM performance and temperamental traits are more indicative of potential long-term issues regarding social competence. Moreover, the kindergarten period may serve as a critical

opportunity for intervention given the importance of SC for school readiness (Blair, 2002; Denham & Weissberg, 2004; Raver & Knitzer, 2002).

Current Study

The current study uses a Social Information Processing framework (Crick & Dodge, 1994; Lemerise & Arsenio, 2000) to further understand children's contributions to their own social adjustment, based on the premise that temperamental dispositions contribute indirectly to social competence by influencing their understanding of social interactions. Children learn about the social world through their actual interactions and through their information processing, both of which are influenced by temperament (interactions: Rothbart & Bates, 2006; information processing: Lemerise & Arsenio, 2000; Teglasi & Epstein, 1998). Patterns in the literature show links between social competence and both temperamental EC (positive; Rothbart et al., 1994; Spinrad et al., 2006; Teglasi et al., 2015) and temperamental NA (negative; Eisenberg et al., 1993; Sallquist et al., 2009; Teglasi et al., 2015). Positive relations have also been established between ToM and SC (e.g., Imuta et al., 2016). Despite having a strong positive relation in theory, empirical links between temperament and ToM are sparse and inconsistent (Longobardi et al., 2017; Blair & Razza, 2007; LaBounty et al., 2016).

The lack of consistent relations in the literature between temperament, ToM, and SC may be explained by two factors. First, commonly used ToM measures for young children typically capture only one key phenomenon of ToM, which is the ability to mentally represent *truths* about external reality (socially constructed) when the information is explicitly provided. However, ToM also involves the ability to mentally represent interpretations or inferences in the absence of direct information (personally

constructed). The current study is the first to use this distinction when considering subtypes of ToM. The first type is termed truth-based ToM in the current study and the latter type is termed interpretation-based ToM. Whereas truth-based ToM connects actions to what one knows about reality, interpretation-based ToM relates actions to subjective interpretations of mental states. In situations with clear response expectations, truth-based ToM would suffice in order to size up the situation accurately. On the other hand, more challenging, emotion laden situations require the individual to interpret the nuances of a specific exchange to inform behavior.

Within the SIP framework, ToM exerts its influence on social information processing when encoding and interpreting cues, which influences the entire trajectory of decision making and actions. Truth-based ToM relies mostly on encoding cues: It involves gathering all the relevant information to discern the truth (which can be either socially constructed or factual) about a situation. For example, recounting the facts to discern that one person knows the location of an object whereas another does not, involves false belief understanding. On the other hand, interpretation-based ToM relies heavily on interpretation when available cues to be encoded are ambiguous and less information is explicitly provided. For example, it may involve predicting how others may react based on how one enters a peer group by drawing on past experiences (personal schemas) to infer their beliefs, motivations, intentions, and emotions. Chapter 3 provides a detailed overview about how each type of ToM is defined and measured.

The second factor that may impact relations between temperament and ToM pertains to the type or types of temperamental traits involved in SIP, depending on the degree of complexity in a given social situation. In routine situations with clear

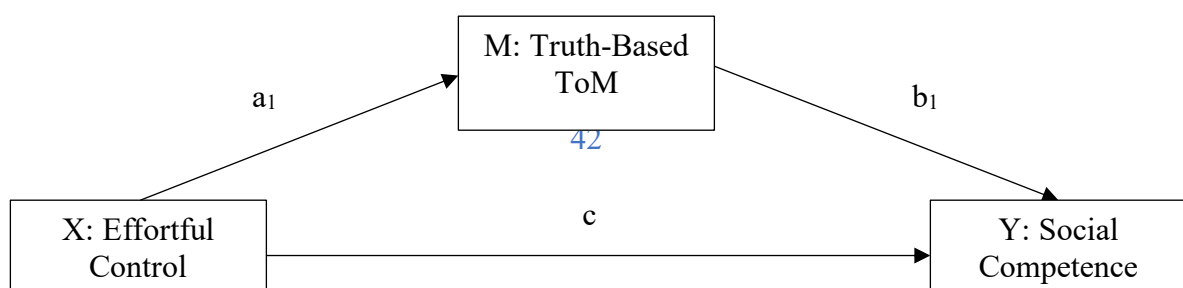
expectations, negative emotions (i.e., temperamental NA) may not have much impact on the child's simplistic and relatively automatic SIP. ToM tasks that provide explicit information about reality (i.e., truth-based ToM) reflect the response expectations of routine social situations. The presence of higher temperamental EC would allow the individual to develop and use that truth-based ToM, whereas NA may be less relevant. In contrast, more complex, emotion laden social situations – such as those requiring perception of subtle social cues to gauge another's perspective – may involve both temperamental EC and NA. ToM tasks that require interpretation of a social scene (i.e., interpretation-based ToM) capture personal schemas that evolve over time and are heavily influenced by the individual's perceived success in navigating emotion laden social challenges. Interpretation-based ToM can be measured through storytelling where an individual's process of inferring mental states and making causal connections between those states and related actions is captured by the thoughts, emotions, and sequences of events they attribute to characters in a picture. This interpretation-based ToM may be more relevant than truth-based ToM when examining the influence of perspective taking in relations between EC and NA interactions with SC outcomes. Such interactions between temperamental traits have been identified in other studies examining the social cognitive mechanisms by which temperament influences SC. For example, EC has been identified as a moderator of the negative effects of NA attentional bias to threat stimuli where a significant positive association was identified between children's NA and attentional bias to threat stimuli only when EC was low (Lonigan & Vasey, 2009).

Mediation Model 1. The first aim of the study was to draw a conceptual distinction between ToM as truth-based (i.e., the ability to mentally represent *truths* and

about external reality, which is either correct or incorrect, when the information is explicitly provided) vs. interpretation-based (i.e., individual differences in interpretations of mental states with varying degrees of appropriateness). When ToM is measured as this individualistic endeavor, rather than a representation of truth, it may provide insight into how children process social information in a manner that is constructed based on personal world views as opposed to shared socially constructed truths. This highly individualistic type of ToM varies from person to person based on their prior experiences and views of the world. The schemas provide categories, assumptions, and understandings that shape perceptions and causal explanations for what is happening in a given situation (Teglas & Epstein, 1998) which captures ToM more broadly. To explore this distinction, this study examined whether truth- and interpretation-based ToM partially mediated the relation between temperamental EC and SC. Within Lemerise and Arsenio's (2000) conceptualization of SIP, it makes sense that temperamental EC would provide an individual with the regulatory traits required to notice and infer accurate information from their social environment. As such, EC may enable the development of ToM, which in turn allows for effective social exchanges.

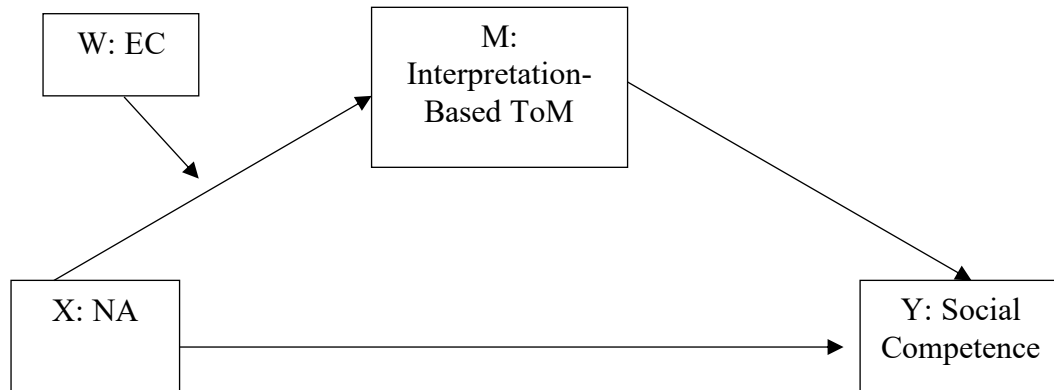
Figure 1 depicts Mediation Model 1 which predicted that both truth-based ToM and interpretation-based ToM would partially mediate the relationship between temperamental EC and SC.

Figure 1. Mediation Model with Truth-Based ToM, Interpretation-based ToM, EC, and SC



Mediation Model 2. The second aim of this study was to evaluate the potential of interpretation-based ToM to partially mediate the relation between NA and SC, under the conditional effects of EC. Reactive temperamental traits defined as NA are thought to hamper the ability to notice and make reasonable inferences about the social environment (Lemerise & Arsenio, 2000). However, the relation between NA and ToM was thought to be moderated by the effect of EC. EC has previously been identified as a moderator of NA's effects on social cognition (e.g., Lanigan & Vasey). The relation between NA and ToM, moderated by EC, was proposed to be particularly relevant in emotion laden social contexts that require the individual to interpret the nuances of a specific exchange to inform behavior. As such, the interpretation-based ToM measure was ideally suited to examine this relationship. Therefore, the second model (Figure 2) proposed that interpretation-based ToM would partially mediate relations between NA and SC, under the conditional (i.e., moderating) effects of EC. By using a new method for conceptualizing and measuring ToM that more closely reflects its use in real world applications, this model could potentially illustrate previously unexamined relations between the confluence of reactive and regulative temperament and ToM.

Figure 2. Moderated Mediation Model with Interpretation-Based ToM, NA, and SC, with EC as moderator



Preliminary examination of relations among variables. Prior to testing the proposed models, the correlations among the target variables were examined. Temperament variables included effortful control (EC) and the interaction between EC and Negative Affectivity (NA). ToM was measured using two performance-based approaches, namely truth-based ToM and interpretation-based ToM. Finally, SC was measured as teacher-rated social skills. Based on previous research findings, significant positive correlations were expected between temperamental EC (teacher ratings) truth-based ToM (performance measure) and SC (teacher ratings). As identified in a previous study using two different data sets, of which one dataset is similar to the one used in the current study (Teglasi et al., 2015), a significant positive correlation was expected between interpretation-based ToM (performance measure) and SC (teacher ratings). Next, significant correlations were expected between the EC*NA interaction variable, interpretation-based ToM, and SC. It was predicted that NA would have a negative effect on ToM and SC at lower levels of EC.

Chapter 3: Methods

Participants

This study is part of a larger research project conducted by Dr. Hedwig Teglassi and a team of graduate student researchers. The current study uses a subset of available data which includes performance measures of ToM and teacher ratings of temperament and social skills. Participants with complete data for all measures were included in this study. In addition, schools with fewer than 5 participants were excluded. Of the potential 168 members in the study, 132 met these criteria. The sample consists of 132 kindergarten students aged 5 to 7 years ($M = 69.19$ months; range = 60 – 82 months) and their teachers ($N = 27$). Participants were recruited from five DC metro area schools, one school from Chicago and one school from New York City. Five of these schools were private Christian schools, one was a laboratory school at a public research university, and one was a public school. The schools were similar in racial ethnic diversity and yielded a moderately diverse sample (62% white, 9% Black, 9% Hispanic, 13% Asian, 6% other or multi-racial, and 1% unknown). School classroom size ranged from 15-25 students with participation rates per classroom ranging from 30 – 60%. All teachers were white and female. The sample includes 75 (57%) males and 57 (43%) females.

Measures

Social Competence. Teachers rated children's social competence using the Social Skills Improvement System (SSIS; approximate completion time is 10 minutes)—a widely used, multi-informant measure of social competence and competing problem behaviors. The 46-item Social Skills Composite is comprised of seven subscales with 6 -7 items per scale: Communication, Cooperation, Assertion, Responsibility, Empathy,

Engagement and Self-Control. Informants were asked to rate the frequency in which the child engages in certain behaviors using a 4-point Likert scale (“Never,” “Sometimes,” “Often,” “Always”). Teachers also rated the importance of the behavior on a 3-point scale (“Not important,” “Important,” “Critical”). The rating scale is made up of four distinct scales: social skills, problem behaviors and an academic competence scale (teacher form only; Gresham et al., 2011). The Social Skills scale was used as an estimate of SC in this study.

Team members hand-scored this measure. Norms based on age were used to produce a total social skills standard score. As reported by Gresham and colleagues (2011), the internal consistency for the teacher-rated SSIS scale is reasonably robust with a coefficient alpha of .90. Furthermore, the test-retest index the scale was .82 for the teacher form (Gresham et al., 2011). In terms of the current sample, total scale reliability was .96 for teacher (N= 124) ratings.

Theory of Mind. Children’s perspective taking abilities were measured in two ways, using a standardized and widely used ToM measure as well as a novel storytelling task.

Truth-Based ToM Measure. Children were administered the ToM subtest from the NEPSY-II (Korkman et al., 2007) with an approximate testing time of 10 minutes, to assess participants’ ability to understand that others have thoughts, ideas, and feelings that may be different from one’s own. The test includes several false belief tasks including unexpected contents tasks, unexpected locations task, and a second order false belief task. Other tasks involve making distinctions between appearance and reality. Finally, the last six items of the test are contextual and provide pictures of a girl in

various stereotypic emotion – provoking situations (e.g., on a rollercoaster or hurting her foot) with her face hidden from view. Participants are required to point to a pictured facial expression that describes how the character would feel in that situation. The measure provides a scaled score with a mean of 10 and a standard deviation of 3. A higher NEPSY II ToM score indicates that the child was able to respond correctly in increasingly difficult tasks, presented in different ways (e.g., pictures, stories, physical demonstrations, and combinations of these). Typically, more difficult tasks had more details or cues to consider when responding.

The ToM subtest is standardized and normed with adequate reliability. Split half reliability is above .80 for the ToM subtest for the age group of 5–6 years. Test-retest reliability for ToM total score in 5–6 years of age group is .77 (Brooks, Sherman, & Strauss, 2009). In this study, the scale has a split-half reliability of .72 (N= 123).

Interpretation-Based ToM Measure. Conceptually, the phenomenon of inferring others' mental states takes place without direct access to the other's perspective as is the case with traditional ToM tasks. Hence, ToM defined as inferring mental states is highly individualistic and varies from person to person based on their prior experiences and views of the world. These world views, or personal schemas, function as working models of self, others, and the world, influencing how individuals perceive, interpret, and ultimately act upon, social cues (Bowlby, 1969; Greenberg & Mitchell, 1983; Westen, 1988). The schemas provide categories, assumptions, and understandings that shape perceptions and causal explanations for what is happening in a given situation (Teglass & Epstein, 1998). Storytelling provides an avenue to measure the manner in which children access personal schemas to attribute inner states to individuals (e.g., feelings, thoughts,

wishes, and intentions), which captures ToM more broadly. The act of verbally attributing mental states to others has also been referred to as MST (mental state talk) (e.g., Pinto, Tarchi, & Accorti, 2018). An advantage of MST as an indicator of ToM derives from its measurement with open-ended verbalizations, which provide access to a wider range of mental states than standard structured measures of ToM (Hughes et al., 2010). MST bears on ToM through its connections to situations and actions, and storytelling requires the individual to weave together mental states, as distinct from external circumstances, and as causes of actions to produce desired outcomes.

The story form is the language of experience (Bruner, 1987), familiar even to young children (Shipley & Zacks, 2008), that coordinates all the components of SIP. Around the age of four, when most children have mastered FB tasks, they are able to tell stories about events in their lives and about pictures in line with their developing schemas (Teglasi, 2010). By age five, children are able to include characters' goals and intentions into the narrative (Astington et al., 2002; Pinto et al., 2015). The task of telling stories about selected pictures, particularly those depicting tension or unfinished business (e.g., Thematic Apperception Test; TAT; Morgan & Murray, 1935), is well suited to measure individual differences in ToM that foster awareness of multiple, potentially conflicting influences, that ultimately shape social behavior. Storytelling measures of ToM are not evaluated on the basis of *what* the answers are (agreed upon right or wrong) but judged according to criteria that reflect *how* ideas are organized (functional relations among narrative components). Children's stories about pictures are rated according to qualities such as accuracy, complexity, and organization of relations among external circumstances, inner states, actions, and outcomes. These ratings therefore capture

information processing along a continuum that is relevant to children's ToM, and have demonstrated relations to well-being, including literacy (Blankman, Teglasi, & Lawser, 2002), empathy (Locraft & Teglasi, 1997), and mental health (Lohr, Teglasi, & French, 2004; McGrew & Teglasi, 1990). In one study, storytelling as a measure of self-regulation was inversely related to children's temperamental NA (Bassan-Diamond, Teglasi, & Schmitt, 1995).

In the current study, Children were administered the TAT (administration time approximately 15 minutes). The TAT is a non-standardized, non-normed performance measure that gives insight into social scripts, schemas and perception utilized by the participant. Participants were shown six black and white pictures, one at a time, and asked to make up a story about each picture. They were instructed to include what is happening in the picture, what happened before, what the characters are thinking and feeling, and to give an ending. The administration protocol is included in Appendix K. Stories were audio recorded and then transcribed verbatim.

Next, the stories were coded by two researchers under the supervision of an expert in the TAT field, using the coding system created by Teglasi (2010). To capture interpretation-based ToM reasoning, stories were numerically coded for level of abstraction (range of 1 - 4), perceptual integration (range of 1 – 5), and self-regulation (range of 1-5). Using this coding system, Abstraction captures how well an individual can describe the pictured scene in a manner that realistically fits with the pictured details *and* goes beyond what is pictured to give reason for the description. For example, when considering a picture of a boy looking down at a violin while appearing despondent, a participant with a high score might say: "The boy is sad because he got a violin, but he

does not know how to play it,” thereby giving a realistic description and interpretation of the scene. In contrast, a low score is given when the story is unrelated to the picture (often borrowed from scripts/ other known stories), provides an overly concrete interpretation of the scene without an interpretation of thoughts, feelings, or events, or merely names parts of the picture. For example, a participant might say: “It’s a boy looking at a violin.” When prompted for further story elements, they may respond with “I don’t know” (no elaboration) or give further concrete details easily observable in the scene (e.g., “he looks sad”). Perceptual Integration overlaps with Abstraction but goes beyond it to examine how the participant coordinates their perception/ description of the scene with the meaning attributed to it (i.e., the interpretation). Stories with high scores provide a realistic explanation of the tensions in the scene including thoughts and feelings that are realistically tied to events, actions, and story outcomes. Finally, Self-Regulation examines information processing more globally with an emphasis on the cohesiveness of the stories and goal directedness of the characters. High scoring stories coordinate characters’ intentions thoughts, feelings, actions and outcomes within appropriate contexts and timeframes and captures decision making and related actions that are tied to standards or goals (thereby capturing all aspects of the SIP models).

Using the same coding system, these stories have been associated with social competence and other indicators of children’s adjustment in prior research. For example, Annotti and Teglassi (2017) found relations between all three coding categories used in this study (abstraction, perceptual integration and self-regulation) and teacher-rated social behaviors. Another study that used the TAT with the same scoring system as used in this study indicated that children rated as high in empathy (a component of SC) by their

teachers received higher scores on the storytelling measure than their low-empathy peers (Locraft & Teglasi, 1997). In addition, the TAT has been used to investigate social information processing and teacher ratings of aggression (Simcox, 2009) and to distinguish emotionally disabled children from nonemotionally disabled children (Lohr et al., 2004; McGrew & Teglasi, 1990).

In the current study, a fixed effects ICC was calculated for absolute agreement among coders, and the results yielded reliability scores of .90 for Abstraction, .89 for Perceptual Integration, and .94 for Self-Regulation, with values higher than .75 representing excellent reliability (Shrout & Fleiss, 1979). Inter-rater reliability rates of .80 or higher have been established in previous studies as well (Blankman et al., 2002; Lohr et al., 2004). In the current study, internal consistency rates across the six stories (using Chronbach's alpha) were found to be in the acceptable range: Abstraction = .89; Perceptual Integration = .83; Self-regulation = .88. As the three scales were substantially correlated with one another ($r = .86 - r = .89, p < .01$), it was reasonable to combine them into one composite score by converting each category into a scale of 1 to 20 and averaging the three scores.

Temperament. Temperament was assessed with the Child Behavior Questionnaire – Teacher Short Form (CBQ-TSF; Teglasi et al., 2015), which was adapted from the CBQ-SF, which is a rating scale for caregivers (Putnam & Rothbart, 2006). The CBQ-TSF is a 94-item scale designed to measure individual differences in the reactive and self-regulatory aspects of temperament. Items are rated on a likert scale scale from 1 (*extremely untrue of this child*) to 7 (*extremely true of this child*), with the option to indicate when particular items do not apply (N/A). The items cluster in 3 broad factors

and 15 subscales: Negative Affectivity (Anger/Frustration, Discomfort, Fear, Sadness, Soothability); Surgency (Activity Level, Approach/Positive Anticipation, High-Intensity Pleasure, Impulsivity, Shyness, Smiling/Laughter); and Effortful Control (Attentional Focusing, Inhibitory Control, Low-Intensity Pleasure, Perceptual Sensitivity). Only the Negative Affectivity and Effortful Control scales are included in the current study. Composite scores were calculated by averaging across items completed for each individual. In line with previous research using the CBQ-SF, data from the current sample for the nine subscales used in this study yield internal consistency values ranging between .68 and .91. Eight of the nine subscales demonstrate adequate internal consistency with alpha values of .70 or higher. One subscale (Perceptual Sensitivity, .68) fell slightly below this threshold, although it has been argued that values above .60 are still acceptable (DeVellis, 1991). Internal consistency within the two factor scales used in this study were .86 for EC and .90 for NA.

Procedure

Procedure for recruitment and data collection. These procedures were part of a larger study that spanned from Spring 2012 to the present. Therefore, the data is archival. The research team, led by Dr. Hedwig Teglassi, consisted of 6 – 8 graduate students at any given time who were enrolled in the University of Maryland College Park's school psychology doctoral program. IRB approval was obtained to conduct a human research study. After contacting and gaining permission from interested school administrations, the research team made presentations to parents and teachers attending a Back-to-School night where they explained the purpose of the study and requirements of parents and children who chose to participate. A letter detailing the study, including IRB information

and a consent form, was placed in the parent mailbox of children attending the kindergarten class. The variables examined in the larger study include social competence, temperament, executive functioning, emotion understanding, ToM, and school readiness. Questionnaires were sent to parents' homes using the parent mailbox and hand-delivered to the teachers' classrooms.

Comprehensive data on participation rate was unavailable for the earlier years of the study but was overall estimated at around 40% of parents and their children. All kindergarten teachers agreed to participate during the recruitment process. Given that only about 40% of parents chose to participate in this study, there is some possible unknown sample bias. Some factors that may have influenced parent and child participation include time availability and general interest or positive attitudes toward research.

Children were taken out of the classroom during free time for 20 to 30-minute testing sessions until they had completed all performance measures (approximately 40–50 minutes total administration per subject). Graduate student members of the research team underwent training in administration of all performance measures. Training consisted of the researchers reviewing instructions, items, responses, and stimulus materials under the guidance of an experienced team member prior to assessing child participants. New researchers then observed an experienced researcher administering the assessment to a child participant, prior to administering the assessment independently.

Preliminary Analyses and Data Analytic Plan

Procedures for Nested Data. The data for this study are nested across seven schools and 27 teachers (see Table 1). As such, one-way ANOVAs were conducted for

teacher-rated variables (EC, NA, and SC) at the school and classroom level to determine whether there were significant between- group differences. The results yielded nonsignificant differences between groups of teachers, indicating that teachers rated children's behavior similarly within each school. However, between group differences were significant for each of the teacher-rated variables at the school level (EC: $F(6, 125) = 3.81, p = 0.002$; NA: $F(6, 125) = 2.35, p = 0.035$; SC: $F(6, 125) = 2.18, p = .049$). Subsequent intraclass correlation coefficients (ICCs) were calculated to estimate the amount of variance that can be explained by school differences. Per the results, school differences accounted for 6.2% of variance in EC, 5% of variance in NA, and 4.8% of variance in SC. As such, the analyses in this study were set to control for the clustering effects of the school variable, weighted according to the number of participants per school.

Table 1. Student Frequency by School

School	Teacher	Student(s)
A	A1	17
	A2	17
	A3	8
	A4	2
	A5	5
		N= 49
B	B1	8
	B2	4
	B3	5
	B4	4
		N = 21
C	C1	6
	C2	6
	C3	12
	C4	3
	C5	6
	C6	1
	C7	3
	C8	1
	C9	3

<hr/>		
		= 41
D	D1	1
	D2	1
	D3	1
	D4	1
	D5	1
		N = 5
E	H1	3
	H2	2
		N = 5
F	I1	6
		N = 6
G	J1	5
		N = 5
<hr/>		

Hypothesis testing: Mediation Analysis

Mediation analysis allows the researcher to investigate by what means a predictor variable (e.g., temperament) exerts its effect on the outcome variable (e.g., SC; Preacher, Rucker, & Hayes, 2007). Two partial mediation tests were conducted to evaluate the study hypotheses. These examined the hypotheses that (1) truth-based ToM and interpretation-based ToM would mediate the relation between temperamental EC and SC, and (2) temperamental EC would moderate the mediation effect of interpretation-based ToM on the relation between temperamental NA, and SC.

The mediation analyses were conducted using Preacher and Hayes' (2008) bootstrapping procedures to provide confidence in the findings by creating a sampling distribution by resampling the dataset thousands of times and calculating the statistic of interest each time. No assumptions need to be met regarding the shape of the sampling distribution to conduct inferential tests when using bootstrapping (Preacher et al, 2007). These models also produce the direct effects between the predictor and mediator, and between the mediator and outcome variable. This approach is useful for social sciences

research where data are often not normally distributed (Hayes & Sharkow, 2013). Using M-Plus statistical software (Muthen & Muthen, 2012), the original sample was resampled with replacement to generate 5,000 samples, and the indirect effects were calculated for each one. A significant indirect effect was indicated if the 95% confidence interval of the sampling distribution does not contain zero (Preacher & Hayes, 2008). Each of the models was run using the Cluster and Weight commands to account for the clustering and weight (i.e., different numbers of participants per school) effects of the school variable, and age was entered as a control variable. The syntax for each model can be found in Appendix L.

Bias-corrected bootstrapping was used to test Hypotheses 1 and 2. The first hypothesis was tested using a mediation model with one predictor (EC), two mediators (truth-based and interpretation-based ToM) and one outcome variable (SC). The mediators were entered in parallel as no sequential influence was assumed. The second hypothesis was tested using a moderated mediation model with one predictor (NA), one mediator (interpretation-based ToM), one moderator (EC), and one outcome variable (SC). The moderated mediation model calculates the indirect effect of NA on SC through interpretation-based ToM, at different levels of EC. This is accomplished by calculating an interaction term between the predictor (NA) and the moderator (EC). To test the model, M-Plus then calculates values for the indirect effect of NA*EC on SC through ToM for each of the 5,000 bootstrapped samples and orders them from smallest to largest. M-Plus also calculates the sampling distribution for the indirect effect of NA on SC through ToM, thus producing a mediation path without the influence of a moderator. M-Plus identifies the upper and lower 95% confidence interval values for each of the

models. If the 95% confidence interval for the moderated path does not contain zero, one can conclude that a significant indirect moderated mediation effect exists. In this case, simple slopes are calculated and examined to determine the nature of the moderated mediation effect at different levels of the moderator (one standard deviation above the mean, one standard deviation below the mean, and at the mean). If any (or all) of these 95% confidence intervals do not include zero, they would indicate a significant indirect effect at that specific level of the moderator (EC). The value of the estimate would also indicate directionality (i.e., a positive or negative effect). If the moderated path *does* include zero, one can examine the second mediation path to determine if the indirect mediation without moderation is significant.

Chapter 4: Results

Descriptive Statistics

Descriptive statistics for measures of temperament, ToM, and SC, as well as age, including means, standard deviations, ranges, and skew are summarized in Table 2 below.

Table 2. Descriptive Statistics

	<i>N</i>	Minimum	Maximum	Mean	<i>SD</i>	Skewness	Kurtosis
Effortful Control (EC)	132	2.21	6.19	4.75	0.79	-0.72	0.43
Negative Affectivity (NA)	132	1.24	5.40	2.90	0.84	0.50	-0.03
Truth-Based ToM	132	1.00	17	10.77	2.63	-1.08	2.38
Interpretation-Based ToM	132	4.33	18	10.58	3.06	0.29	-0.51
Social Competence (SC)	132	67	130	100.83	12.69	0.45	-0.18
Age (Months)	132	60	82	69.19	4.57	0.14	-0.39

The data were collected from 132 participants. The independent variables are temperamental effortful control (EC) and negative affectivity (NA), the mediators are perspective taking, labeled as Truth-Based ToM and Interpretation-Based ToM, and the independent variable is social competence (SC). The measures included responses from all 132 participants. All responses fell within the acceptable ranges as indicated by the minimum and maximum scores. The skewness and kurtosis values indicate that nearly all measures do not deviate significantly from a normal distribution. The one exception is the Truth-Based ToM measure, which is negatively skewed and leptokurtic, indicating

low spread of data points. Notably, the mediation analyses used in this study do not assume normality of data distribution (Hayes & Scharkow, 2013).

Preliminary Analyses

Partial correlations were conducted to examine the relations between each of the variables of interest: temperamental EC and NA, the interaction effect EC*NA, Truth-Based ToM, Interpretation-Based ToM, and SC. The control variables were school and age in months. Age was controlled for as the Interpretation-Based ToM measure is not normed based on age. Results of bivariate correlations indicated a significant association between age in months and Interpretation-Based ToM ($r = .27$, $p = .003$) but not with any other study variables. The results are summarized in Table 3 below.

Table 3. Partial Correlations Among Variables Controlling for Age (in Months) and School

Scale	1	2	3	4	5	6
Effortful Control – EC (1)	1	-.30**	.26**	.26**	.36**	.59**
Negative Affectivity - NA (2)		1	.83**	-.16	.02	-.49**
NA*EC (3)			1	.01	.24*	-.16
Truth-Based ToM (4)				1	.24**	.27**
Interpretation-Based ToM (5)					1	.30**
Social Competence -SC (6)						1

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

Model 1. Results of the partial correlational analyses yielded significant positive relations between the predictor (EC) and both mediators (Truth-Based ToM, $r = .26$, $p < .01$; Interpretation-Based ToM, $r = .36$, $p < .01$). Correlations were also significant and positive between the outcome variable (SC) and both mediators (Truth-Based ToM, $r = .27$, $p < .01$; Interpretation-Based ToM, $r = .30$, $p < .01$). Finally, the relation between the predictor (EC) and outcome (SC) variables was significant and positive ($r = .59$, $p < .01$).

Model 2. Results of the partial correlational analyses yielded a nonsignificant relation between the predictor (NA) and mediator (Interpretation-Based ToM). However, the correlation between the predictor-moderator interaction term (NA*EC) and mediator (Interpretation-Based ToM) was significant and positive ($r = .24, p < .05$). The relation between the mediator (Interpretation-Based ToM) and outcome (SC) was significant and positive ($r = .30, p < .01$) whereas the relation between the predictor (NA) and outcome (SC) was significant and negative ($r = -.49, p < .01$).

Hypothesis Testing: Mediation Analysis

Hypothesis 1: Bootstrapped mediation procedures were used to test the hypothesis that Truth-Based and Interpretation-Based ToM partially mediates the relation between temperamental EC and social competence (SC). Mediation analyses based on 5,000 samples using bias-corrected 95% confidence intervals (Preacher & Hayes, 2004) indicated that temperamental EC had a significant indirect effect on social competence via Truth-Based ToM, as the standardized 95% confidence interval for the values of ab did not include zero [LL= .01, UL= .08]. Examination of the estimate of the indirect effect suggests that EC has a small but significant positive indirect effect on SC through Truth-Based ToM (Model 1: $a_1b_1 = .05$). This coefficient for the indirect effect signifies that for each standard deviation increase in EC, SC increased by .05 standard deviations as a result of EC's effect on Truth-Based ToM, which in turn affected SC. Results related to the indirect effect can be viewed in Table 5.

Results revealed significant standardized regression coefficients on the a_1 and b_1 pathways of the mediation model. Specifically, analysis revealed that EC had a significant positive effect on Truth-Based ToM ($\beta_a = .26, p < .01$), which suggests that

higher levels of EC positively influence one's Truth-Based ToM abilities. Truth-Based ToM demonstrated a significant positive effect on SC ($\beta_b = .18, p < .01$), indicating that a higher level of Truth-Based ToM contributes to a higher level of SC via EC. Analysis also revealed a significant direct effect of EC on SC, ($\beta_c = .50, p < .01$). Analysis revealed nonsignificant effects of age on each of the variables in the model. Regression coefficients can be viewed in Table 4 and Figure 3.

However, results of the analysis also indicated that temperamental EC did not have a significant indirect effect on social competence via Interpretation-Based ToM, as the standardized 95% confidence interval for the values of the a_2b_2 path included zero [LL= -.03, UL= .14]. Results revealed significant standardized regression coefficient on the a_2 pathway of the mediation model. Specifically, analysis revealed that EC had a significant positive effect on Interpretation-Based ToM ($\beta_a = .35, p < .01$), which suggests that higher levels of EC positively influence one's Interpretation-Based ToM abilities. The standardized regression coefficient was nonsignificant for the b_2 path of the model, indicating that a significant relation was not detected between levels of Interpretation-Based ToM and SC as influenced by EC. Analysis did reveal a significant direct effect of EC on SC (c path), ($\beta_c = .49, p < .01$). Finally, analysis revealed nonsignificant effects of age on each of the variables in the model. All regression coefficients can be viewed in Table 4 and Figure 3.

Overall, the results suggest that EC has a significant positive effect on young children's level of Truth-Based ToM, which in turn has a significant impact on social competence. Thus, temperamental EC positively influences social competence partially

through Truth-Based ToM ability. The same relation was not detected for Interpretation-Based ToM.

Table 4. Standardized Regression Coefficients for Model 1

Antecedent		Consequent										
		M1 (T-ToM)			M2 (I-ToM)			Y (SC)				
		Coeff.	SE	<i>p</i>	Coeff.	SE	<i>p</i>	Coeff.	SE	<i>p</i>		
X (EC)	<i>a</i> ₁	.26	.06	.00	<i>a</i> ₂	.35	.07	.00	<i>c</i> '	.46	.08	.00
M1 (T-ToM)		--	--	--		--	--	--	<i>b</i> ₁	.15	.08	.04
M2 (I-ToM)		--	--	--		--	--	--	<i>b</i> ₂	.13	.15	.40
C (Age)	<i>f</i>	.09	.13	.46	<i>g</i>	.14	.10	.16	<i>h</i>	.04	.06	.53

Figure 3. Standardized Regression Coefficients for Model 1

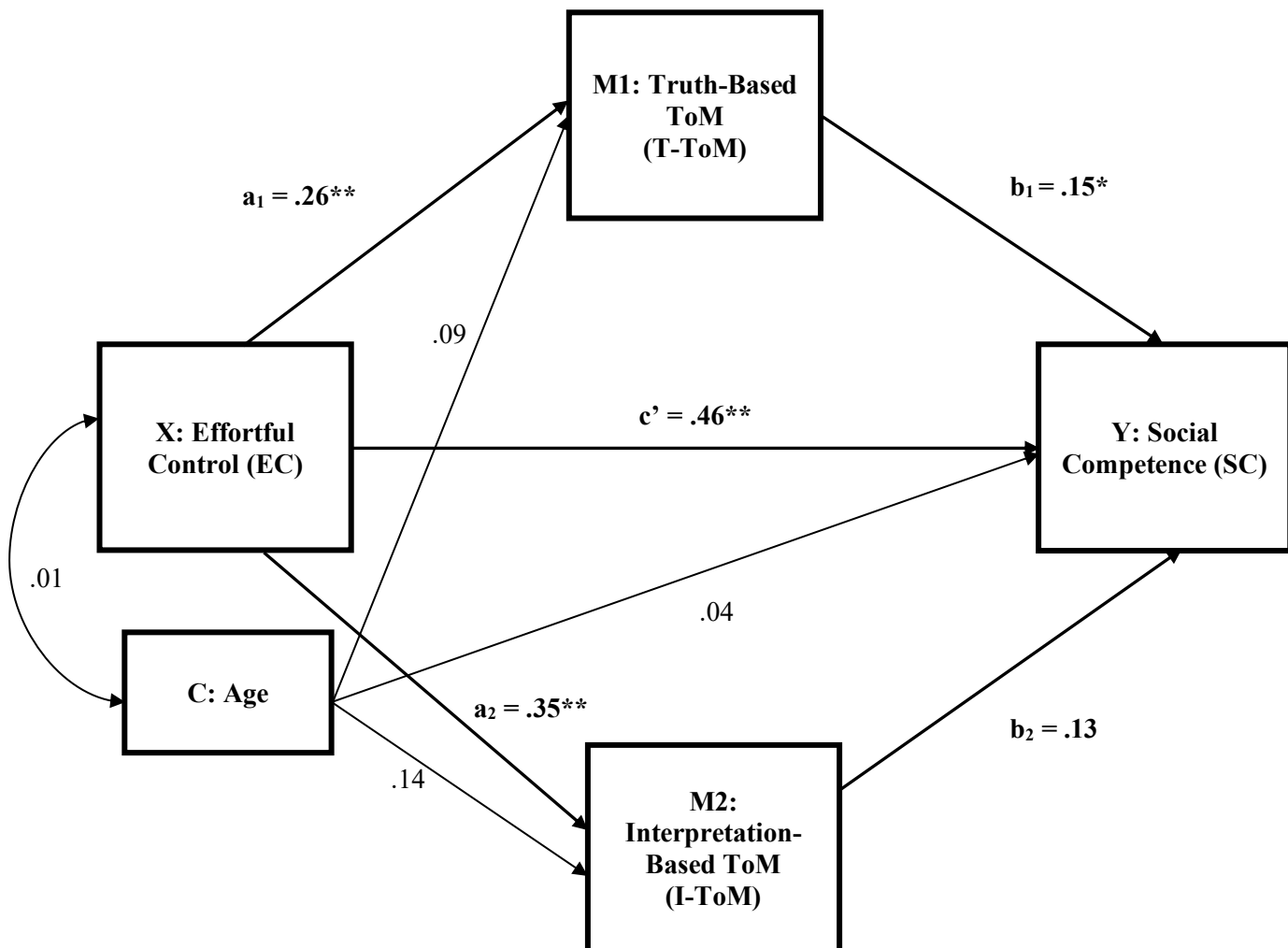


Table 5. Standardized Bootstrapped 95% Confidence Intervals of the Indirect Effect

Specific Indirect Effect	Point Estimate	Bias-Corrected 95% Confidence Interval	
		Lower	Upper
<i>Model 1</i>			
EC, T-ToM, SC*	.05	.01*	.08*
EC, I-ToM, SC	.04	-.04	.13

Note: *The indirect effect is considered to be significant if the confidence interval does not include zero.

Hypothesis 2: Bootstrapped moderated mediation procedures were used to test the hypothesis that temperamental EC moderates the mediation effect that Interpretation-Based ToM has on the relation between temperamental negative affectivity (NA) and social competence (SC). The standardized regression coefficients confirmed an expected negative relation between the predictor (NA) and outcome (social competence; $r = .51$, $p < .01$) and a positive relation between the mediator (Interpretation-Based ToM) and outcome (social competence, $r = .13$, $p = .02$). As expected, the relation between the predictor (NA) and mediator (Interpretation-Based ToM) was non-significant, as the relation was expected to be moderated by EC. Finally, the relation between the NA*EC interaction term and Interpretation-Based ToM was non-significant within the context of the model. Results related to the regression coefficients can be viewed in Table 6 and Figure 4.

Moderated Mediation analyses based on 5,000 samples using bias-corrected 95% confidence intervals (Preacher & Hayes, 2004) indicated a significant indirect partial moderated mediation effect as the 95% confidence interval for the moderated path did not contain zero [LL = 0.06; UL = 0.14]. Examination of the estimate of the indirect effect

suggests an overall small, but significant, overall moderated mediation effect (path $b_2b_4 = .054$). The 95% confidence interval of the non-moderated path (i.e., the mediation of Interpretation-Based ToM on the relation between NA and SC) *did* include zero, indicating that mediation without the presence of the moderator was not supported. Next, the simple slopes at three levels of the moderator EC (low = 2, moderate = 4, high = 6) were calculated to examine the nature of the indirect mediation effect at different levels of the moderator. The simple slope set at high EC was significant and positive (point estimate = .31, LL = 0.01; UL = 0.37) whereas the simple slopes set at low and moderate EC were non-significant as they included zero. Results related to the indirect effects can be viewed in Table 7.

Table 6. Standardized Regression Coefficients for Model 2

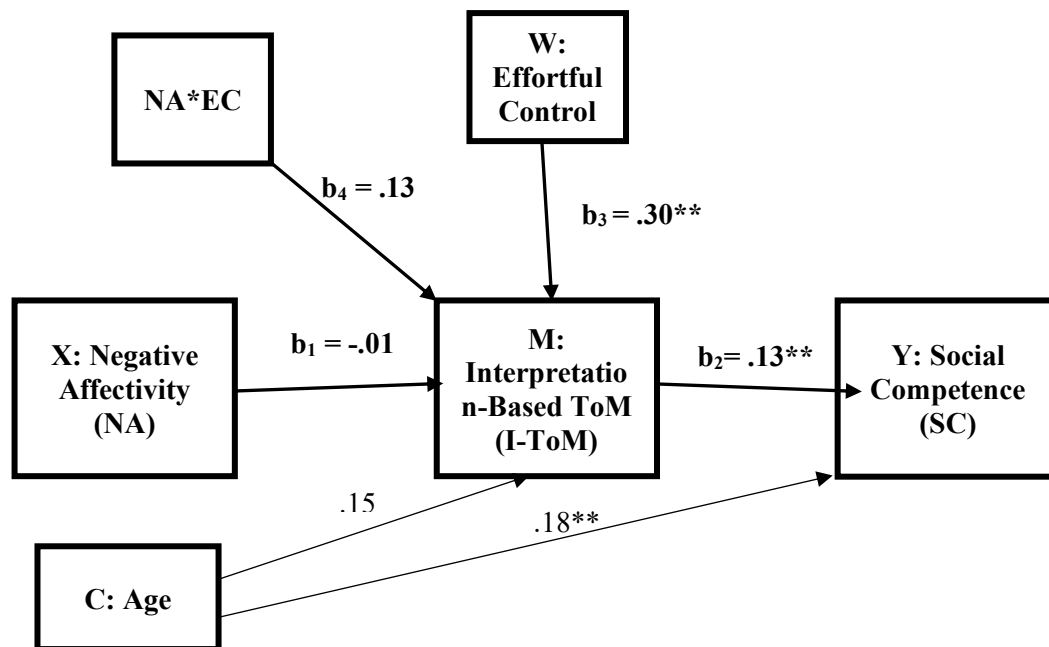
Antecedent	Consequent							
	M (I-ToM)				Y (SC)			
	Coeff.	SE	p		Coeff.	SE	p	
X (NA)	b_1	-.01	.20	.98		-.51	.18	.01
W (EC)	b_3	.30	.01	.00	b_1	.15	.08	.04
X*W (NA*EC)	b_4	.13	.11	.22		--	--	--
M (I-ToM)		--	--	--	b_2	.13	.15	.02
C (Age)		.15	.10	.14		.18	.08	.02

Table 7. Non-standardized Bootstrapped 95% Confidence Intervals of the Indirect Effect

Specific Indirect Effect	Point Estimate	Bias-Corrected 95% Confidence Interval	
		Lower	Upper
<i>Model 2</i>			
NA, I-ToM, SC, moderated by EC (b ₂ b ₄)*	.05	.01*	.14*
NA, I-ToM, SC, without moderation (b ₁ b ₂)	-.02	-.61	.19
<i>Model 2 Simple Slopes</i>			
NA, I-ToM, SC, moderated by low EC (2)	.09	-.41	.24
NA, I-ToM, SC, moderated by moderate EC (4)	.20	-.20	.30
NA, I-ToM, SC, moderated by high EC (6)*	.31	.01*	.37*

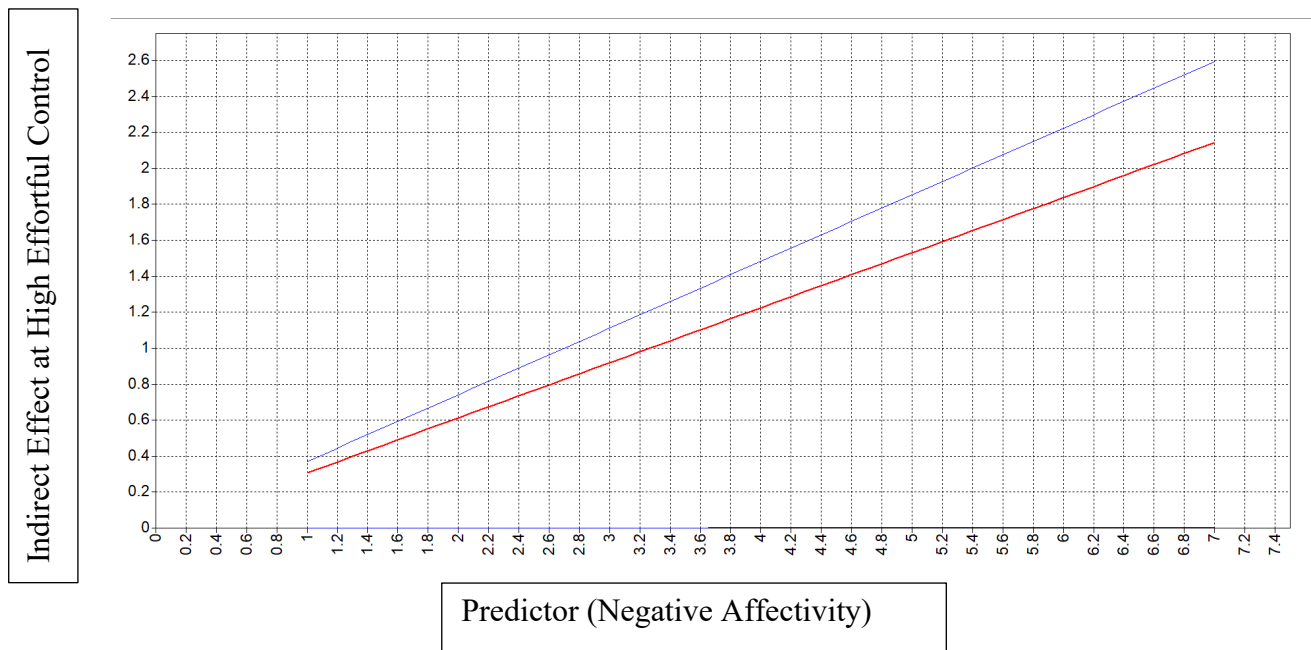
Note: *The indirect effect is considered to be significant if the confidence interval does not include zero.

Figure 4. Standardized Regression Coefficients for Model 2



The indirect effects at different levels of EC were plotted to better understand the nature of the moderation effect. As seen in Figure 5, Interpretation-Based ToM mediated relations between NA and social competence in a positive direction when EC is high. In other words, when EC was high, higher NA was associated with higher social competence partially *through* the influence of Interpretation-Based ToM.

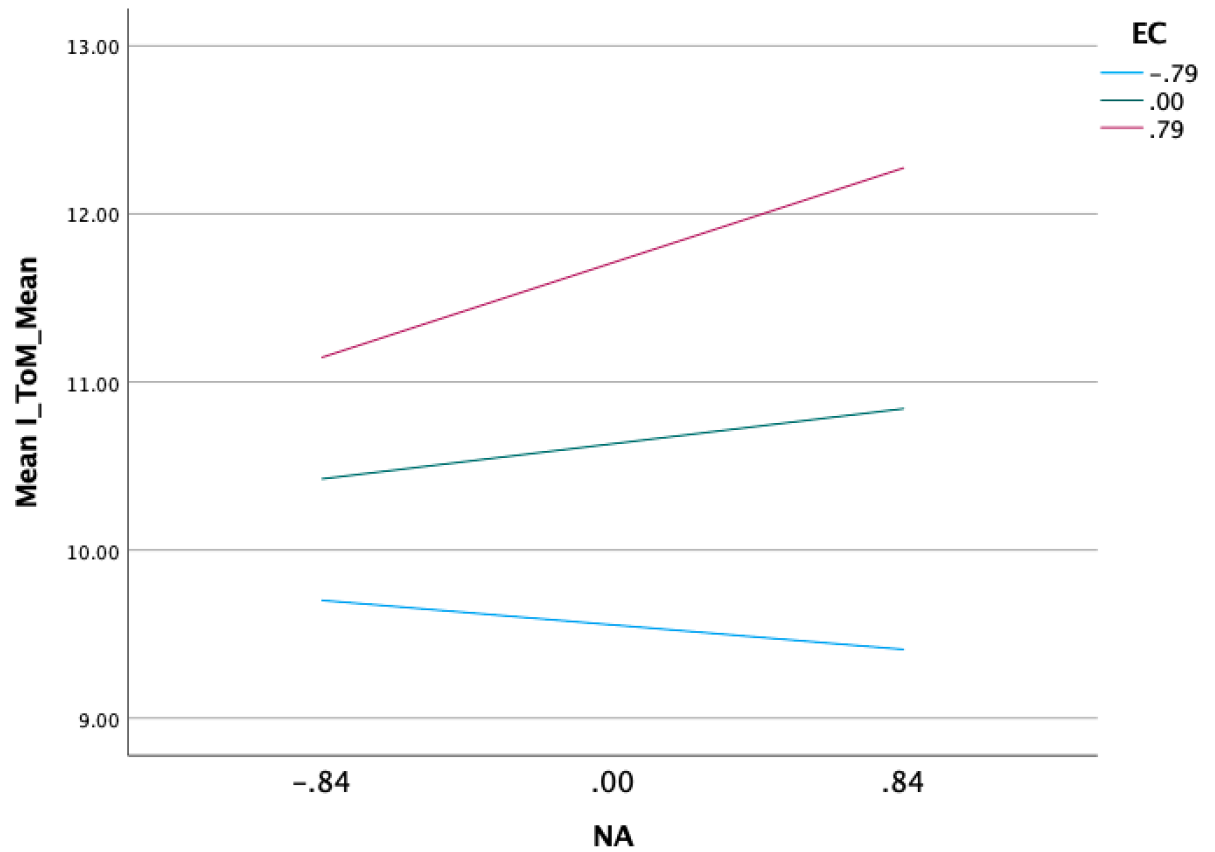
Figure 5. Indirect Effect Moderated by High EC



Next, the direct effects between NA and Interpretation-based ToM at different levels of EC were explored. In Figure 6, standardized values of NA and EC were plotted

against Interpretation-Based ToM. As illustrated below, higher NA was associated with higher Interpretation-Based ToM when the level of EC was high. Associations relating to low and moderate EC were nonsignificant.

Figure 6. Direct Effect of NA on Interpretation-Based ToM by level of EC



Overall, the moderated mediation model was significant and positive. The moderated slopes of the indirect effect indicated that Interpretation-Based ToM mediated relations between NA and social competence, only when EC was high. Thus, although there was a direct negative relation between NA and SC, the results of this model indicated that, when individuals have high EC, NA positively affects social competence partially *through* increased Interpretation-Based ToM.

Finally, a comparative model using Truth-Based ToM instead of Interpretation-Based ToM as a partial mediator, with or without moderation, was not hypothesized and could not be tested given the lack of a bivariate correlation between both NA and NA*EC with Truth-Based ToM during preliminary analyses.

Chapter 5: Discussion

Theory of Mind (ToM) describes the process of inferring others' mental states and making predictions about their related behavior. Using a Social Information Processing framework (Crick & Dodge, 1994; Lemerise & Arsenio, 2000), young children develop ToM through social exchanges and related information processing, which ultimately leads to improved social competence. Social competence is characterized as effectiveness in social interactions (Rose-Krasnor, 1997), and is a vital component of children's short- and long-term social, emotional, and school or career outcomes (Raver and Knitzer, 2002; Hamre & Pianta, 2001; Ladd et al., 2006). Positive relations between ToM and social competence are widely established (e.g., Imuta et al., 2016) and were replicated in the current study. Another factor contributing to social competence is temperament, or biologically based individual differences in emotional reactivity and self-regulation (Rothbart & Bates, 2006). As identified in the current study, as well as in previous research, temperamental Effortful Control (EC; i.e., regulatory traits that incorporate self-control and attentional characteristics) is associated with better social competence (Rothbart et al., 1994; Spinrad et al., 2006; Teglasi et al., 2015), whereas Negative Affectivity (NA; i.e., reactive traits that are driven by strong negative emotions) is generally associated with poor social outcomes (Eisenberg et al., 1993; Sallquist et al., 2009; Teglasi et al., 2015).

Of interest in the current study was how temperament contributes to ToM, and eventually social competence. Temperamental EC is thought to positively influence social information processing (which includes ToM), as well as social competence, by allowing the individual to regulate attention and behavior in a manner that facilitates

social engagement and learning. In contrast, temperamental NA is thought to hamper a child's ability to engage in and learn from the social environment as the child may be more attuned to addressing immediate emotional distress, as opposed to forming and working towards social goals (such as solving a peer conflict). Despite having a strong positive relation in theory, empirical links between temperament and ToM are sparse and inconsistent.

To explain the lack of links between temperament and ToM, this study aimed to draw a conceptual distinction between ToM as truth-based (i.e., the ability to mentally represent *truths* and about external reality, which is either correct or incorrect, when the information is explicitly provided) vs. interpretation-based (i.e., individual differences in interpretations of mental states with varying degrees of appropriateness). In other words, whereas truth-based ToM connects actions to what one knows about reality, interpretation-based ToM relates actions to subjective interpretations of mental states. ToM measures for young children typically capture only Truth-Based ToM. It was proposed that truth-based ToM may suffice in situations with clear response expectations when coupled with the self-regulatory capacity (i.e., EC) to notice these expectations and behave accordingly. In contrast, it was proposed that emotion-laden situations that provide incomplete or equivocal cues may require the use of interpretation-based ToM, which would be influenced by both regulatory and reactive temperamental traits. To examine this distinction between two types of ToM, this study explored the mediating effects of Truth- and Interpretation-Based ToM on the established relations between temperament and social competence.

Measurement Approach

The sample consisted of 132 racially and ethnically diverse kindergarteners. Temperament (EC and NA) and social competence were measured using rating scales completed by participants' kindergarten teachers. Truth-based ToM was measured using a prototypical, standardized performance test which included several false-belief and appearance-reality distinction tasks. These tasks explicitly provide the cues that participants need to consider to arrive at correct responses. Interpretation-based ToM was measured using a storytelling task where participants were asked to tell stories based on tension-laden pictures. These stories gave insight into social scripts, schemas and perception utilized by the participant, and were coded based on the participant's ability to interpret the scenes beyond behavior description and emotion labeling. Higher scores required children to coordinate characters' thoughts, feelings, actions and outcomes, which requires the inferring of mental states. In accordance with real life social exchanges, a wide range of responses were possible and were judged based on their level of appropriateness relative to the specific context.

Hypothesis 1: ToM Mediates Relations Between Temperamental Effortful Control and Social Competence

The distinction between Truth-and Interpretation-Based ToM was first explored by examining the effects of both types of ToM on relations between temperamental EC and social competence. From a SIP framework, Children with high EC are thought to use attentional and inhibitory control to monitor and adjust their behavior in social settings (Olson et al., 2005), thereby placing them in a better position to engage in perspective taking and to select responses that match social goals, such as building or maintaining positive relationships (Lemerise & Arsenio, 2000). As such, it was predicted that both

types of ToM would have positive mediation effects on relations between temperamental EC and social competence.

Preliminary Correlations. Preliminary correlations, accounting for nesting and age effects, mirrored existing literature (Rothbart et al., 1994; Spinrad et al., 2006; Teglasi et al., 2015) in demonstrating a large positive relation between temperamental EC and SC. Correlations also demonstrated a similar, moderate, link between ToM and social competence as is often seen in the literature (Imuta et al., 2016). This relation was apparent using both the prototypical Truth-Based ToM measure, as well as the novel Interpretation-Based ToM measure. This finding provides support for the use of Interpretation-Based ToM, measured through storytelling to account for a significant amount of variance in young children's social competence. Correlations between temperament and ToM were also consistent with those found in the literature (Longobardi et al., 2017; Blair & Razza, 2007; LaBounty et al., 2016), with significant associations found between temperamental EC and truth-based ToM. The correlation between EC and interpretation-based ToM was also positive and significant. This supports the reasoning that higher EC facilitates children's approach to and participation in positive social interactive experiences which reflect and impact their social understanding (Rothbart & Bates, 1998; Wellman et al., 2011). In other words, these regulatory traits enable social attentiveness and eventual development of ToM through social learning.

Hypothesis Testing. The results of the bootstrapped parallel mediation analysis yielded partially significant mediation effects: Truth-Based ToM did in fact mediate relations between temperamental EC and SC with the paths in this part of the model

following the expected patterns of influence. In other words, EC had a significant positive effect on Truth-Based ToM, which had a significant positive effect on social competence. Examination of the estimate of the indirect effect suggests that temperamental EC positively influences social competence *through* Truth-Based ToM ability. Contrary to the predicted outcome, Interpretation-Based ToM did *not* mediate relations between temperamental EC and SC. Although EC had a positive and significant effect on Interpretation-Based ToM, the effect of Interpretation-Based ToM on social competence, as influenced by EC, was nonsignificant.

The significant indirect effect using Truth-Based ToM builds on previously established direct links among EC, ToM, and social competence by highlighting ToM's ability to serve as a *mechanism* by which temperamental EC affects social competence. The model seems consistent with the reasoning that EC facilitates children's ability to attune to their social environment, which affects their ability to mentally represent truths about external reality (i.e., Truth-Based ToM), which in turn affects their ability to engage effectively in social exchanges. Further longitudinal research would be required to confirm this.

Although Interpretation-Based ToM was expected to mediate relations between temperamental EC and social competence, the finding that this was not the case is consistent with initial theorizing that relations between temperament and Interpretation-Based ToM are complex and likely involve affective factors in combination with EC. Although a moderate relation was detected between EC and Interpretation-Based ToM, as well as a significant bivariate correlation between Interpretation-Based ToM and social competence, the relation between Interpretation-Based ToM and social competence was

non-significant within the mediation model, indicating that the aspects of EC that contribute to Interpretation-Based ToM are not as relevant in the context of social competence. This finding supports the contention of more complex relations between temperament and Interpretation-Based ToM. This distinction between the two types of ToM was already supported in the initial bivariate correlations where the interaction between temperamental EC and NA was only significant for Interpretation-Based ToM, thereby providing support for Hypothesis 2 discussed below, where more complex relations between temperament and social competence were explored.

Hypothesis 2: Interpretation-Based ToM Mediates Relations between Temperamental NA and Social Competence, Under the Conditional Effects of Temperamental EC

A secondary aim of the study was to evaluate the potential of interpretation-based ToM to demonstrate links between ToM and Temperamental NA that previous studies (using prototypical Truth-Based ToM measures) were unable to identify. It was proposed that the relatively simple or complex nature of social exchanges may more or less rely on the use of certain temperamental traits: In routine situations with clear expectations, temperamental NA may not have much impact on the child's simplistic and relatively automatic SIP involved in truth-based ToM. The presence of higher temperamental EC would allow the individual to develop and use that truth-based ToM, whereas NA may be less relevant. In contrast, more complex, emotion laden social situations – such as those requiring perception of subtle social cues to gauge another's perspective – may involve both temperamental EC and NA. ToM tasks that require interpretation of a social scene (i.e., interpretation-based ToM) capture personal schemas that evolve over time and are

heavily influenced by the individual's perceived success in navigating emotion laden social challenges.

It was proposed that Interpretation-Based ToM would mediate the relation between temperamental NA and SC, under the conditional (or moderating) effects of EC. The relation between NA and ToM was thought to be moderated by the effect of EC, as EC has previously been identified as a moderator of NA's effects on social cognition (e.g., Lonigan & Vasey, 2009). It was predicted that higher temperamental NA would contribute to lower SC, through the effects of lower Interpretation-Based ToM, particularly when temperamental EC was low. Previous research has shown that the adverse effect of NA on social and emotional outcomes is mitigated by higher EC (Moran et al., 2013). NA was predicted to be associated with lower Interpretation-Based ToM as intense negative emotions (Rothbart, 2011) may influence what is noticed and the meaning attributed to a social situation (Crick & Dodge; Lemerise and Arsenio, 2000), particularly in the absence of adequate EC.

Preliminary Correlations. Accounting for nesting and age effects, correlations mirrored existing literature (Sallquist et al., 2009; Teglasi et al., 2015) in demonstrating a large negative relation between temperamental NA and SC. Children with high NA likely act to relieve immediate distress, rather than choosing longer term goals targeted at maintaining positive social relationships, which in turn leads to lower social competence (Verron and Teglasi, 2018; Stewart et al., 2010). Negative reactive traits are thought to hinder children's exposure to, and emotional availability for, social learning and thereby to result in lower ToM competence. However, this relation did not show up in the current study in that NA was not significantly correlated with either type of ToM; neither were

there a significant correlation in previous studies with truth-based ToM measures (e.g., Wellman et al., 2011; Longobardi et al., 2017). In the current study, it was proposed that this relation between NA and ToM may be more complex and influenced by the child's level of EC. Specifically, it was proposed that high EC may compensate for high NA, as it would provide the child with the traits necessary to regulate difficult emotions in social settings. As such, it was thought that the combination of *low* EC and higher NA would contribute to low ToM ability, particularly in more complex situations that call for Interpretation-based ToM. As such, a preliminary correlational analysis was run between the interaction term of NA and EC with TOM, to affirm that a moderated mediation analysis would be appropriate for the data. As expected, this resulted in a significant association of NAXEC with Interpretation-Based ToM, but not with Truth-Based ToM. This pattern supports the reasoning of the current study, in that Interpretation-Based ToM may be called for in complex situations impacted by temperamental NA, whereas Truth-Based ToM may not be relevant. Although the correlation coefficient between NAXEC and Interpretation-Based ToM was positive, further analysis was needed to determine the directionality of the relations between the variables.

Hypothesis Testing. As predicted, the results of the bootstrapped moderated mediation analysis yielded a significant moderated mediation effect. Results indicated that temperamental NA does in fact affect social competence *through* the effects of Interpretation-Based ToM, under certain conditions of temperamental EC. The mediation model without moderation was nonsignificant, further supporting the proposal that this particular relation between NA, Interpretation-Based ToM, and social competence, is relevant only at certain levels of EC.

Simple slopes of the indirect effect set at low, moderate, and high levels of EC revealed that the mediation effect was moderated by *high* EC, as opposed to low EC. Specifically, model results pointed to a positive indirect effect where NA was associated with higher social competence, through the effects of higher Interpretation-Based ToM, when EC was high. In other words, although higher NA is directly associated with lower social competence, the combination of higher NA and EC appears to contribute to better developed Interpretation-Based ToM, which in turn is associated with higher social competence. This result was consistent with previous research illustrating the mitigating effects of high EC on relations between NA and social outcomes (Moran et al., 2013). However, findings did not support the prediction that NA paired with *low* EC would relate to lowered ToM and SC. A closer look at the study sample, as well as measured temperament constructs, shed light on this finding: First, when considering sample characteristics, it is worth noting that this study used a non-clinical sample of typically developing kindergarteners. This is reflected in the spread of NA ratings, which fell mostly on the low end of the 7-point Likert scale (mean = 2.9, 90th percentile = 4.07), with no significant outliers, where even the highest ratings reflected moderate NA, as opposed to high NA. Whereas *extreme* levels of NA lead to poor social outcomes (Oldehinkel et al., 2004; Rothbart, 2011; Sanson et al., 2004), moderate NA may tell a different story. For example, when measuring emotional reactivity through cortisol levels, moderate reactivity has been associated with better social-cognitive skills and social engagement (Lane et al. 2013; Blair et al., 2005) whereas high reactivity was associated with poor outcomes (Keller, El-Sheikh, Granger, & Buckhalt, 2012). Thus,

moderate emotional reactivity may increase children's attention to emotionally laden social stimuli, which in turn facilitates the development of Interpretation-Based ToM.

As mentioned before, the positive interaction effect of high NA and EC on social outcomes has also been found in previous studies. For example, Stifter and colleagues (2009) found that, among toddlers with high NA and low approach, those with higher EC performed better on Truth-Based ToM tasks and demonstrated more prosocial behaviors as preschoolers compared to their peers with lower EC. In another longitudinal study, high levels of infant NA were only associated with young children's poor social competence when attentional control (which forms part of EC), was poor (Belsky, Friedman, & Hsieh, 2001). Abramson and colleagues (2018) also identified that 9-month-old infants high in NA showed greater empathic concern and inquisitiveness at age 18-months old compared to those with low NA, if they demonstrated greater ability to regulate emotion. In a cross-sectional study, Lonigan and colleagues (2004) investigated the effects of NA and EC on children's attentional bias regarding threat-related stimuli. Six hundred children within a non-clinical population were screened for anxious traits as well as levels of EC and a sample of 104 was selected to represent the extreme scores. Results demonstrated that children high in NA generally displayed a larger attentional bias toward threat-related stimuli than children with low NA. However, there was a significant interaction where children with high NA and low EC demonstrated significant threat bias, whereas those with high NA and high EC did not. In other words, high EC allowed individuals with high NA to size up their environment more accurately. There was no differential effect of EC for children with low NA as children with low NA did not demonstrate attentional bias.

Overall, the findings of the current study align with previous research in highlighting positive links between NA and social outcomes (both cognition and behavior) when EC is high. The emotional arousal associated with *moderate* NA leads to the experience of more intense negative emotions that, if paired with sufficient regulatory abilities, may lead to more social sensitivity as individuals are able to recognize these emotions both in themselves and in others (Eisenberg et al., 1998; Wellman et al., 2011). Such sensitivity to emotion laden social cues would then allow for better developed Interpretation-Based ToM, and in turn, better social competence.

Comparing Two Types of ToM within the context of Temperament and SC

The results of this study provide support for the distinction of two types of ToM that are associated with different dimensions of temperament that ultimately contribute to social competence. The results of the first hypothesis provide further support for existing theory and research about relations between temperamental regulation, Truth-Based ToM, and social competence. Specifically, existing literature on temperament and ToM suggest that temperamental regulatory traits produce a calm and socially observant temperament that is optimal for social cognitive development (Lane et al., 2013; Wellman et al., 2011). The results of this study support this reasoning, as EC was associated with higher social competence, through the mediating effects of Truth-Based ToM. The same relation was not found with Interpretation-Based Tom, suggesting that associations between temperament and Interpretation-Based Tom are more multiply determined, as discussed next.

As proposed in this study, Interpretation-Based ToM conditionally mediated relations between NA and social competence, based on level of EC. Specifically, when

EC was high, NA positively predicted social competence, through increased Interpretation-Based ToM. This finding supports the proposed idea that Interpretation-Based ToM is multiply determined and depends on a more complex interplay of temperamental regulatory and reactive traits. Whereas Truth-Based ToM is more directly linked to regulation, Interpretation-Based ToM seems to rely on some degree of reactivity, or emotional arousal, as well. The tendency to experience a range of negative emotions, paired with the ability to regulate them, may allow a child to develop better sensitivity to more complex emotionally laden social cues in themselves and in others. This is exactly the kind of skillset needed to engage in Interpretation-Based ToM when the social context is more complex and perhaps tension laden. Although it was predicted that the pairing of *high* NA and low EC would predict lower Interpretation-Based ToM and eventual lower social competence, the study sample characteristics were likely unable to capture the detrimental effects of more extreme NA. In a sample that includes participants with higher levels of NA, it would be reasonable to expect that high NA and low EC would predict lowered Interpretation-Based ToM and social competence, whereas moderate NA and high EC (as in the current sample) would predict higher Interpretation-Based ToM and social competence. There is likely a tipping point where extremely high NA, even when paired with high EC, would be detrimental to ToM and social competence. In fact, a combination of high NA and high EC would be unexpected as the two are inversely related, as indicated by the preliminary correlations. If there were to be a subset of individuals with high NA and high EC, it would be important to investigate the aspects of EC that were high and whether they may be detrimental to

social functioning (e.g., a highly anxious child who focuses intensely on certain aspects of exchanges but may miss others).

Taken together, the results of this study point towards two types of ToM that are related to social competence through different mechanisms related to temperament: The first mechanism replicates previous research and describes a scenario where a well-regulated child may have the attentional control and sensitivity to learn socially constructed truths about external reality, which relates to Truth-Based ToM and eventual social competence. The second mechanism suggests a new scenario where a child who experiences a range of negative emotions, – but can regulate them well enough to control attention and remain sensitive to their environment—is better able to develop subjective interpretations about mental states in emotion laden contexts (i.e., Interpretation-Based ToM), which is also associated with better social competence.

A Novel Assessment Approach to ToM

This study differentiated between types of ToM that serve different functions in social interactions introducing a new approach to measuring interpretation-based ToM by coding stories told about TAT pictures (Murray, 1935) with an updated coding approach (Teglasi, 2010). Using this coding system, the TAT captures how well an individual can (1) describe a pictured scene in a manner that realistically fits with the pictured details *and* goes beyond what is pictured to give reason for the description, (2) coordinate their perception/ description of the scene with the meaning attributed to it (i.e., the interpretation or the *why*), and (3) coordinate characters' intentions thoughts, feelings, actions and outcomes within appropriate contexts and timeframes and captures decision making and related actions that are tied to standards or goals. In doing this, this study

demonstrated that it is feasible to capture the more complex type of social information processing involved in interpretation-based ToM efficiently using a storytelling task paired with structured coding guidelines. This measurement approach can be used to identify children's social cognitive strengths and weaknesses, which can lead to the development of more individualized and effective interventions.

Limitations and Future Directions

Limitations. The current study contributes meaningful insights into relations between temperament, ToM and social competence, yet there are study limitations that need to be recognized as well. First, the study sample provided minimal power to detect significant effects in the model. Although sample size was sufficient to detect small effect sizes in parts of the model, it cannot be ruled out that other potential effects were missed due to the relatively small sample size. The study sample was also limited regarding the relatively low spread of NA ratings. Within this sample of typically developing kindergarteners, NA ratings mostly ranged from low to moderate. As such, the potential effects of extreme NA could not be detected. Future research would benefit from the inclusion of participants that display more extreme levels of NA.

Another limitation relates to the limited scope of temperamental traits included in the current study. The current study included two of three major temperamental domains (Rothbart, 2011), namely EC and NA. Previous research involving either ToM (Song et al., 2016) and social competence (Teglasi et al., 2015; Sallquist et al., 2009) has also examined the third domain, namely Surgency/ Extraversion (SE), which includes traits that describe activity levels, positive emotionality, and impulsive behaviors. SE was excluded from the current study, given its complex relations with both ToM and social

competence, depending on the combinations of SE traits that can be more or less adaptive in relation to social outcomes (see Appendix B). Nevertheless, with sufficient power, the inclusion of SE may shed light on more nuanced relations between temperament, types of ToM, and social competence. It would also allow for better comparison between the current study results and existing studies that use combinations of EC, NA, and SE traits when examining links with social cognition and behavior (e.g., Song et al., 2016).

A final limitation of the current study relates to the cross-sectional nature of the data. It is generally accepted that longitudinal designs are preferred as they offer the ability to explore temporal precedence among variables (Spector, 2019). Notably, longitudinal designs come with their own challenges in nonexperimental studies, as assessing one variable (X) before another (Y) does not guarantee that X *occurred* before Y, a phenomenon that gets even more complex when examining levels of traits, rather than discrete events (Spector, 2019). However, the methodology of the current study remains effective in its ability to (1) rule out alternative explanations for associations between variables by using multiple sources of data (i.e., performance measures and teacher report) and adding important control variables (i.e., age and school) and (2) explore the effects of a new concept, namely a distinction between Truth- and Interpretation Based ToM, within the context of a mediating role between temperament and social competence.

Future Directions. The findings of the current study provide a starting point for several avenues for future research. First, as mentioned previously, a larger sample size can be used to explore the nonsignificant findings to determine whether they were due to limited sample size or not. Second, the inclusion of a clinical sample may shed light on

the effects of extreme NA on ToM and social competence. Moreover, the addition of temperamental SE would allow for a more nuanced exploration of the interplay between temperament and social outcomes, as SE traits such as approach and shyness have been associated with both ToM (Wellman et al., 2011) and SC (Spinrad et al., 2006), particularly when combined with other temperamental traits (Longobardi et al., 2017). As the current study already established that relations between temperament and Interpretation-based ToM are multiply determined, it is likely that SE traits would play an important role as well.

In contrasting two types of ToM, the current study illustrated how different combinations of temperamental traits and ToM abilities contribute to better social competence. In the current study, it was proposed that different types of temperamental characteristics and ToM abilities may be at play in different social contexts that vary in their complexity. A natural next step in this research would be to tease apart the different aspects of social competence that are associated with these combinations of temperamental traits and ToM abilities. It would make sense that EC and Truth-Based ToM are associated with more routine aspects of social competence such as cooperation and rule-following, whereas the combination of EC, NA, and Interpretation-Based ToM may be associated with more higher order social skills such as empathy and conflict resolution. Gathering this information would ultimately allow for the design of interventions that match an individual's specific social cognitive and behavioral needs, as it relates to their temperamental profile.

Appendices

Appendix A: Temperament Definitions by Prominent Theorists – Summarized from Goldsmith and Colleagues, 1987

	Goldsmith	Buss and Plomin	Rothbart
Definition and boundaries of Temperament	Emotion-based framework: Individual differences in the probability of experiencing and expressing the primary emotions and arousal. Focus on behavioral level as it is most meaningful in social contexts and facilitates immediate empirical investigation. T refers to behavioral tendencies rather than actual occurrences of emotional behavior, and is indexed by the expressive aspects of emotion. T dimensions form the emotional substrate of some later personality characteristics. (e.g., T proneness to anger affects development of aggressiveness).	Set of inherited personality traits that appear early in life. Traits are genetic in origin, appearing during the first year of life. It excludes differences that are not personality traits (e.g., intelligence) and other individual differences that tend to disappear and have no enduring effect on personality (e.g., rhythmicity; regularity in sleeping). It also excludes traits that originate solely from environmental events.	It is the relatively stable, primarily biologically based individual differences in reactivity (and self-regulation. Reactivity is the arousability of the behavioral, endocrine, autonomic, and central nervous system response as assessed through response patterns of threshold, latency, intensity, rise time, and recovery time. Self regulation includes processes such as attention, approach, avoidance and inhibition that serve to modulate (enhance or inhibit) reactivity. Behaviorally, it can be observed at all ages as individual differences of emotionality, activity and attention. Temperament does not current motivation, knowledge structures, and expectations. Temperament is the entire “personality” of the newborn – additional personality structures and strategies (beyond temperament) develop through maturation and interactions with environment.
Elements of Temperament	Individual expression of primary emotions: anger, sadness, fear, joy, pleasure, disgust, interest, and surprise.	3 traits: (1) emotionality (equivalent to distress – varies from stoic to intense emotional reactions); (2) activity (two major components are tempo and vigor); (3) sociability – preference for being with others vs alone.	Three dimensions: positive reactivity, negative reactivity, and behavioral inhibition.
Development of Temperament	A basic set of emotions are present in rudimentary form from very early infancy. Temperamental characteristics do not become stable until emotion systems become integrated into a functional system (e.g., fear system typically becomes integrated in relation to strange humans around 7-8 months). Later on,	Basic emotions evolve to become more nuanced with age – e.g., distress becomes distress, fear, and anger. Temperaments are expected to change in mean level (vigor and tempo) over course of childhood, but patterns remain similar.	Temperament is relatively stable while, at the same time, undergoing change in connection with maturational transitions. Change may occur in one dimension while others remain stable. Periods are identified where certain changes take place in first years of life – along with physiological changes.

	the behavioral expression of temperamental dimensions more likely to be inhibited or enhanced during development than are the underlying subjective feeling states and neurophysiological substrates.		
Is temperament personological, relational, or interactive?	Any aspect of human personality lies on continuum between personological and relational poles, with temperament near personological pole.	Temperament is set of personality traits, which is a personological position.	Temperament exists within the person. Behavioral expression and phenomenological experience of temperament will be influenced by degree of stimulation and regulation provided by environment. There is a strong emphasis on goodness of fit and adaptability.
How does the approach deal with temperamental “difficulty?”	As the definition is at the behavior level and not social interaction, the approach does not treat difficulty.	It refers to children who are hard for caregivers to handle. There are no specific characteristics that classify it, rather generalities.	It does not include difficulty construct. It values more objective designators such as latency, intensity, and recovery parameters. There are social costs and benefits to each temperament characteristic.

Appendix B: Social Competence and Positive Reactive Temperament (SE)

Positive reactivity also refers to general patterns of overreaction to stimuli with subsequent high arousal. High levels of PR are often associated with highly active, impulsive children with poor behavior and emotion regulation (Rothbart, 2011). This high approach tendency can result in frustration when goals are blocked (Rothbart, Derryberry, & Hershey, 2000), which can lead to aggression and other externalizing behaviors. For example, young children rated high on surgency/ extraversion have been shown to use aggressive strategies to overcome barriers when seeking a desired object (Rothbart & Putnam, 2002). Thus, when composites of PR (such as surgency/ extraversion) are elevated due to high Impulsivity and Activity, they may result in a child who is quick to react emotionally and therefore misses important social cues (Rothbart & Putnam, 2002). On the other hand, expressions of positive emotions such as Smiling/Laughter paired with Approach may facilitate the initiation and regulation of social exchanges with peers (Denham et al., 1990; Dougherty, 2006), thereby providing more opportunities to develop appropriate social skills (Pekrun et al., 2002). These differences aid in explaining the inconsistent links between surgency/ extraversion composite scores and SC see table below).

Impulsivity. Children with high Impulsivity tend to act without thinking (Arsenio & Lemerise, 2004), therefore leaving no time attend to situational cues and to foster the skills needed to engage in successful social exchanges. Thus, high impulsivity is associated with a lack of SC and low peer likability (Spinrad et al., 2006).

Smiling/laughter. Children who score high in this category tend to react positively to their environment with frequent overt displays of smiling and laughter. Associations

between smiling/laughter and SC tend to be moderate to large and positive. Children who display positive emotions may enjoy increased social learning opportunities as others enjoy playing with them. In one study, it was proposed that Smiling/Laughter may contribute to social effectiveness by enhancing the growth of one component of SIP, namely emotion understanding (Verron & Teglassi, 2018).

Shyness. A High level of Shyness refers to an individual's tendency to withdraw from new people or situations. Shyness is typically included in the positive reactivity composite as *low* Shyness. Relations between Shyness and SC appear to be inconsistent, ranging from positive to negative. Shyness may hinder SC as these children are less likely than their approach-oriented peers to initiate social interactions (Rydell et al., 2005). On the other hand, there is evidence that shy children are more likely to display empathy and conscience, skills indicative of social competence (Rothbart et al., 2000). Shyness may help some aspects of SC while hindering others, as evidenced by Rudasill & Konold (2008) who found that teachers rated shy children high in cooperation and self-control, but low in assertion. The authors propose that attention focusing provides the mechanism for the shy child to overcome social weariness by gathering the necessary information from their environment to successfully initiate peer contact. However, children who were rated high in both shyness and attentional focusing were rated higher in SC. Rubin and colleagues identified an interaction effect where shy children with low levels of emotion regulation were more socially anxious and reticent, whereas high regulation contributed to independent play (Rubin et al., 1995).

Relations between Social Competence & Positive Reactivity

Study	Participants				SC Measure		Temperament Measure	
	N	% Boys	Age	Demographics	Type	Domains	Type	
Denham et al., 1990	65	3-5	54%		Peer ratings	Likeability	Classroom observations	Ex
Rothbart et al., 1994	80	50%	6-7	White, diverse SES	Parent ratings	Empathy	CBQ-P	
Spinrad et al., 2006	193	T1: 4-7 T2: 6-9	49%	Moderately at risk for behavior problems, moderately diverse race/ ethnicity, diverse SES	Parent ratings Teacher ratings	SC	CBQ-P CBQ-T CBQ-P CBQ-T	
Berdan et al., 2008	200	45%	T1:3-4 T2:5-6	Diverse race/ ethnicity & SES	Kindergarten sociometric nominations	T2 Social preference	CBQ-P	
Sallquist et al., 2009	157	50%	5- 13	Moderately diverse race/ ethnicity, mid SES	Teacher ratings	SC over 4 time points	Parent ratings Teacher ratings CBQ-P	P int
Mathieson & Banerjee, 2010	104		2	UK, mid SES, urban	Teacher ratings	Prosocial behavior		
Dollar & Stifter, 2012	90	T1:4.5 T2		Mid SES	T2 Lab observations T2 parent ratings	Positive peer behaviors SC	T1 Lab observations	
Teglasi et al., 2015 (preschool sample)	134	47%	3-4	Diverse race/ ethnicity, mid SES	Teacher ratings	SC (SSIS)	CBQ-P CBQ-T	A S A
Teglasi et al., 2015 (Kindergarten sample)	105	51%	5-6	Diverse race/ ethnicity, mid SES	Teacher ratings	SC (SSIS)	CBQ-P CBQ-T	S A S A

					Parent ratings	SC	CBQ-P	A
							CBQ-T	A
								S
Dollar et al., 2018	406	T1:2 T2: 7	47%	Diverse SES	Teacher ratings	T2 SC	Parent ratings	T1

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

Relations Between Positive Reactivity & Problematic Peer Interactions

Study	Participants				Problem Behavior Measure		Temperament Measure		Effect
	N	% Boys	Age	Demographics	Type	Domains	Type	Domain(s)	
Rothbart et al., 1994	80	50%	6-7	White, diverse SES	Parent ratings	Aggression	CBQ-P	Surgency	.54*
Lengua & Long, 2002	101		7-11	Diverse race/ethnicity and SES	Parent ratings	Externalizing problems	Parent ratings	Positive emotionality	-.02
Gunnar et al., 2003	82	55%	3-5	Majority white, mid SES	Teacher ratings	Aggression	CBQ-T	SE	.51*
Putnam & Stifter, 2005	109	48%	2	Majority White, mid SES	Parent ratings	Externalizing problems	Lab observations	Approach High Intensity Positivity	.28* .27*
Mathieson & Banerjee, 2010	104		2	UK, mid SES, urban	Parent ratings	Peer problems	CBQ-P	SE	-.22*
Dollar & Stifter, 2012	90	T1:4.5 T2		Mid SES	T2 Lab observations	Negative peer behaviors	T1 Lab observations	surgency	.29*
					T2 parent ratings	Aggression			.23

Chen et al., 2014	162	27	Diverse ethnicity and SES to represent US Census data	Parent ratings	Behavior problems	CBQ-P	SE	.21*
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* = $p < .05$; ** = $p < .01$

Appendix C: Social Competence and Negative Reactivity

Study	Participants				SC Measure		Temperament
	N	% Boys	Age	Demographics	Type	Domains	
Denham et al., 1990	65	3-5	54%		Peer ratings	Likeability	Classroom observations
Eisenberg et al., 1993	93	52%	4-6	Majority White, Mid SES, suburban	Teacher and observer ratings	SC	Parent ratings
Rothbart et al., 1994	80	50%	6-7	White, diverse SES	Parent ratings	Empathy	CBQ-P
Blair et al., 2004	153	52%	3-4	Moderately diverse race/ ethnicity; mid SES	Teacher ratings	SC	CBQ-P
Sallquist et al., 2009	157	50%	5- 13	Moderately diverse race/ ethnicity; mid SES	Teacher ratings	SC over 4 time points	Parent ratings Teacher ratings
Mathieson & Banerjee, 2010	104	-	2	UK, mid SES, urban	Parent ratings	Prosocial behavior	CBQ-P
Zhou et al., 2010	382	47%	6-9	Chinese, urban, low to mid SES	Parent ratings	T1 SC	CBQ-P
					Teacher ratings		CBQ-T
					Parent ratings	T2 SC	CBQ-P
					Teacher ratings		CBQ-T
Kolak et al., 2013	110	45%	2	Majority White, mid to high SES, experiencing minor illness	Parent ratings	SC	Parent ratings
Rispoli et al., 2013	6,850	51%	4-6	Racially/ ethnically diverse, diverse SES	Parent ratings	SC (kindergarten)	Parent ratings
Taylor et al 2014	213	55%	T1: 2.5 T2: 7	Majority white, diverse SES	Parent & Teacher ratings - averaged	SC	CBQ-P

Lengua & Long, 2002	10 1		7- 11	Diverse race/ethnicity, diverse SES	Parent ratings	Externalizing problems	Parent ratings	Negative emotionality	.45**
Blair et al., 2004	15 3	52%	3-4	Moderately diverse race/ethnicity, mid SES	Teacher ratings	Externalizing problems	CBQ-P	Irritable Sad/ fearful	.13; .03 .09; -.05
Mathieson & Banerjee, 2010	10 4		2	UK, mid SES, urban	Parent ratings	Peer problems	CBQ-P	Negative affect	.24*
Kolak et al., 2013	11 0	45%	2	Majority White, mid to high SES, experiencing minor illness	Parent ratings	Externalizing problems	Parent ratings	Anger/ frustration Social Fearfulness	.71** .19*
Chen et al., 2014	16 2		2-7	Diverse ethnicity and SES to represent US Census data	Parent ratings	Behavior problems	CBQ-P	NA	.54**
Northerner et al., 2016	10 4	53%	1.5, 2	Low SES, majority Black, young mothers	Parent ratings	Externalizing problems	ECBQ-P	NA	.33**
Nozadi et al., 2018	77	53%	3-5	University preschools, predominantly higher SES and parent education, diverse race/ethnicity	Teacher ratings	Aggression	Teacher ratings	Anger Sadness	.42** .15

Note: Correlation coefficients separated by semicolon indicate scores by gender as males; females.

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

Appendix E: Social Competence & Regulatory Traits

Study	Participants		Age	Demographics	SC Measure		Temperament Measure
	N	% Boys			Type	Domains	Type
Eisenberg et al., 1993	93	52%	4-6	Majority White, Mid SES, suburban	Teacher and observer ratings	SC	Parent ratings
Rothbart et al., 1994	80	50%	6-7	White, diverse SES	Parent ratings	Empathy	CBQ-P
Raver et al., 1999	51	3-5	49%	Low SES, Head Start, Majority white	Teacher ratings	SC	Lab observations
Blair et al., 2004	153	52%	3-4	Moderately diverse race/ethnicity, mid SES	Teacher ratings	SC	CBQ-P
Spinrad et al., 2006	193	T1: 4-7	49%	Moderately at risk for behavior problems, moderately diverse race/ethnicity, diverse SES	Parent ratings	SC	CBQ-P
		T2: 6-9			Teacher ratings		CBQ-T CBQ-P CBQ-T
Rydell et al., 2007 Study 1	129	8	50%	Sweden, high parental education	Teacher ratings	Prosocial orientation	Self-report
Rydell et al., 2007 Study 2	135	9		Sweden, mid SES	Teacher ratings	Prosocial orientation	Self-report
Rudasill & Konold, 2008	1,097	4.5-8	64%	Majority white, mean years of parent education = 14.2 years	Teacher ratings	Assertion	CBQ-P
						Self-control	
						Cooperation	
Mathieson & Banerjee, 2010	104		2	UK, mid SES, urban	Parent ratings	Prosocial behavior	CBQ-P
Zhou et al., 2010	382	47%	6-9	Chinese, urban, low to mid SES	Parent ratings	T1 SC T2 SC	CBQ-P
					Teacher ratings		CBQ-T
					Parent ratings		CBQ-P
					Teacher ratings		CBQ-T CBQ-P CBQ-T CBQ-P CBQ-T CBQ-P CBQ-T

Dollar & Stifter, 2012	90	T1:4.5 T2:5-6		Mid SES	T2 Lab observations	Positive peer behaviors	T1 Lab observations
Teglasi et al., 2015 (preschool sample)	134	47%	3-4	Diverse race/ethnicity, mid SES	T2 parent ratings Teacher ratings	SC SC (SSIS)	CBQ-P CBQ-T
Teglasi et al., 2015 (Kindergarten sample)	105	51%	5-6	Diverse race/ethnicity, mid SES	Teacher ratings	SC (SSIS)	CBQ-P CBQ-T
					Parent ratings	SC	CBQ-P CBQ-T
Nozadi et al., 2018	77	53%	3-5	University preschools, predominantly higher SES and parent education, diverse race/ethnicity	Teacher ratings	SC	Teacher ratings

Note: Correlation coefficients separated by semicolon indicate scores by gender as males; females.

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

Appendix F: Regulatory Traits and Problematic Peer Interactions

Study	Participants				Problem Behavior Measure		Temperament Measure		Effect
	N	% Boys	Age	Demographics	Type	Domains	Type	Domain(s)	
Rothbart et al., 1994	80	50%	6-7	White, diverse SES	Parent ratings	Aggression	CBQ-P	EC	-.38*
Lengua & Long, 2002	101		7-11	Diverse race/ethnicity and SES	Parent ratings	Externalizing problems	Parent ratings	Self-regulation	-.50*
Gunnar et al., 2003	82	55%	3-5	Majority white, mid SES	Teacher ratings	Aggression	CBQ-T	LOW Effortful control	.58*
Blair et al., 2004	153	52%	3-4	Moderately diverse race/ethnicity, mid SES	Teacher ratings	Externalizing problems	CBQ-P	EC	-.22*; -.07
Mathieson & Banerjee, 2010	104		2	UK, mid SES, urban	Parent ratings	Peer problems	CBQ-P	EC	-.007
Dollar & Stifter, 2012	90	T1: 4.5 T2		Mid SES	T2 Lab observations	Negative peer behaviors	T1 Lab observations	Self-soothing	.18
					T2 parent ratings	Aggression			-.10
Chen et al., 2014	162		2-7	Diverse ethnicity and SES to represent US Census data	Parent ratings	Behavior problems	CBQ-P	EC	-.47*
Northern et al., 2016	104	53%	1.5, 2	Low SES, majority Black, young mothers	Parent ratings	Externalizing problems	ECBQ-P	EC	-.33*
Nozadi et al., 2018	77	53%	3-5	University preschools, predominantly higher SES and parent education, diverse race/ethnicity	Teacher ratings	Aggression	Teacher ratings	EC	-.48*

Note: Correlation coefficients separated by semicolon indicate scores by gender as males; females.

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

Appendix G: ToM Development

The development of ToM understanding begins in infancy and continues to develop and become more complex throughout early and middle childhood. Although some have distinguished between cognitive and affective strands of ToM (e.g., Dvash & Shamay-Tsoory, 2014) with aspects of cognitive ToM typically preceding the development of complex affective ToM that requires integration of cognitive and emotional information (Westby & Robinson, 2014; Sebastian et al., 2012), others have argued that such trajectories are a product of measurement constraints, rather than true developmental trajectories (Powell et al., 2018; Scott, & Baillargeon, 2017; Buttelmann, Carpenter, & Tomasello, 2009).

Implicit ToM begins to emerge between birth and six months as infants respond to emotional reactions of others and display contagious empathy (i.e., sharing emotions with others; Gallagher & Hutto, 2008). Infants develop responsive joint attention around 6-8-months of age, begin to initiate joint attention on objects and for social interaction around 8-12 months (Mundy & Newell, 2007), and come to understand the physical relation between a person's line of sight and their behavior around 13-17 months (Westby & Robinson, 2014). By 18-24 months, children begin to consciously recognize distress in others and can predict that certain external events (e.g., getting a broken toy) will make someone unhappy (Westby & Robinson, 2014). Implicit continues to develop between 18 months to 3-years old with the emergence of a sense of self and pretend play. Around 18 months to 2 years of age, children begin to recognize that people may have different desires. Some studies have shown that 18 to 24 month olds exhibit understandings of FB

or ignorance as measured by gaze, although they fail verbal FB tasks until around age 4 (Powell et al, 2017; Buttelmann et al., 2009).

By age 3, children come to verbally convey an understanding that people's actions are determined by their thoughts, desires, and intentions, and that different people are able to see different things (Westby & Robinson, 2014). 3-year-olds are able accurately recognize non-social emotions, evidenced by their ability to match emotion words to photographed faces (happy, sad, mad, and afraid; (Bretherton & Beeghly, 1982; Ridgeway, Waters, & Kuczaj, 1985; Widen & Russell, 2008) and match emotion words to pictured external events (e.g., that losing a toy will make someone sad; Cutting & Dunn, 1999). During this stage, 3-year-olds begin to exhibit conscious affective empathy or altruism as they attempt to comfort others or toys during pretend play (Thompson & Newton, 2013). Yet, even though children as young as 3 can recognize emotions and even understand external causes of emotions, cannot communicate causal connections between internal mental states and emotion until a later stage.

The first explicit ToM to emerge is typically false belief understanding (i.e., distinguishing between beliefs and reality, and understanding that others might hold false beliefs about something) False Belief (FB) understanding emerges around age 3-5 (Saltzman-Benaiah & Lalonde, 2007; Wellman et al., 2001; Ornaghi et al., 2014). Most three-year-olds appear to perceive desires and beliefs as objective features of the world: they think that their own ideas regarding desires and beliefs about the true state of affairs apply to everyone. Around the age of five, children begin to appreciate the fact that people have different desires and beliefs, and at this age, they are able to predict others' emotions accordingly, even if they find those desires undesirable (Rieffe et al., 2001) or

find out that others' beliefs differ from their own knowledge about the situation (i.e., FB understanding; Hadwin & Perner, 1991; Harris et al., 1989; Rieffe et al., 2000). Children who are able to solve false belief-tasks are aware of the fact that others may hold different perspectives from their own, and that people tend to act on the basis of those beliefs, whether objectively true or not. However, there is much variation in the age at which these competencies develop, and these differences have been attributed to individual factors including language ability and parental education and occupation (Cutting & Dunn, 1999).

Around the time when false belief understanding develops (4-5 years old), children begin to predict what someone is feeling based on their beliefs and understand that emotions link to beliefs or perceptions, rather than external reality (Westby & Robinson, 2014). However, although most 4-5-year-olds grasp cognitive false beliefs, they do not all make the links between belief and emotion. For example, in their story-based study, Harris and Colleagues (2002) found that 4-5-year-olds could tell that Red Riding Hood didn't know it was a wolf at her door, but many did not yet connect that she was therefore not scared. By age 6, most children fully grasped the dynamic. Notably, children who grow up in environments where caregivers use mental state talk (i.e., talking about their own and others' mental states with children) develop a variety of mental state words (e.g., think, know, guess and remember) and may develop ToM earlier than their peers (Stanzione & Schick, 2014).

Children aged between 4 and 6 years also begin to understand that people can outwardly express one emotion while internally feeling a different emotion (Harris et al., 1986). At this stage, they learn that emotions are linked to desires, such that two people

might feel differently about the same situation because of differing desires (Harris et al., 1989). In another example, when study participants were told that a story character was feeling differently than would be expected (e.g., feeling angry after hearing a loud noise while in bed at night), most children aged 6 and older were able to give an explanation for the unexpected feeling that related to the character's desires or beliefs (e.g., the character was angry because she knew it was her brother being noisy and she wanted to sleep). Younger children (age 4) more often attributed the unexpected emotion to the external cues provided about the situation, rather than making inferences about the character's beliefs and desires (Ornaghi et al., 2014). Therefore, in the study by Ornaghi and colleagues (2014), older children were able to use affective ToM in order to reason about the ambiguous social cues in the story.

By age 6-8 years old, children develop second-order false belief, enabling them to predict what one person is thinking about what another person is thinking or feeling (e.g., Grueneisen, Wyman, & Tomasello, 2015). Recognition of more complex emotions in others like fear, anger, surprise, and disgust continue to emerge up to age 7 (Denham & Couchoud, 1990; Harris et al., 1987; Widen & Russell, 2008). Other, higher order ToM abilities typically develop around age 8-10 years and involve understanding strategies to hide or detect deceit, understanding figurative language, and recognizing elements of sarcasm and lies (Westby & Robinson, 2014). 8-10-year-olds also typically understand that one can have two concurrent yet opposite type emotions in response to a situation and come to recognize emotionally laden sarcasm, lies, and social faux pas.

To summarize, implicit ToM begins to emerge soon after birth and continue to develop into rudimentary and then more complex explicit ToM throughout early and middle childhood.

Explicit ToM typically emerges between ages 4-5 when children start to communicate differences between beliefs and reality and can differentiate their own beliefs from those of others. Soon thereafter, around age 4-6, children begin to explicit make links between beliefs and emotions and learn that people may have different emotions about a situation based on their beliefs.

Appendix H: ToM and Social Competence

Study	Participants				ToM Measure	
	N	% Male	Age	Demo-graphics	Type of ToM Task	Component(s) Assessed**
Krebs & Sturupp (1974)	24	50%	8-9		Role taking tests (Flavell, 1968) -predict another's strategy in a guessing game and predict what story another might tell if they saw only 4 of the 7 pictures that the participant saw.	Truth/interpretation
Green (1975)	20 Boys	100%	5	Lower and middle class	Movie clips – emotion recognition and causal attribution of emotions (watch 8 movie clips – identify main character's emotion. Shown pictures of possible people/ objects that caused emotion – had to describe how the emotion was produced by that person or object (identify causal agent, plus causal reasoning) – scored by 2 judges as correct/ incorrect for each movie clip. Used clips that were simple and as true to life as possible.	Truth
	20 Girls	0%				
Johnson (1975a)	104	--	11	White, mixed SES	Affective perspective taking task (Rothenberg, 1970) Each story recording depicted a change of feelings for the main character from his initial comments to his later ones. Child was asked to describe how that actor felt and why he felt the way he did. Scoring: Descriptions of feelings: -2 to +2, most credit when accurately mentioning the change in feelings. Understanding of motives: "Why did he feel that way?" 22 to +3, (1 for simple repetition from story, 2 for logical inference of the context, 3 for (a) an implication that the behavior of the actors toward each other caused certain of the actor's feelings, or (b) an indication of some thoughts the actor might be having in the particular situation.	Lower scores for truth, higher for interpretation
Johnson (1975b)	24	38%	9-11	White, middle class	Affective perspective taking task (Rothenberg, 1970)	Lower scores for truth, higher for interpretation
Rushton & Weiner (1975)	60	50%	7, 11	Lower middle SES, UK	Various cognitive non-FB ToM experiments. E.g., Explain a game to a blindfolded person; draw an object from various people's physical perspectives	Truth
Barret & Yarrow (1977)	39 Boys	100%	5-8	Majority White, upper middle class	Social interaction videos with abrupt change in behavior brought on by external emotion laden cues. Participants were asked why the characters' behavior changed. (e.g., a child performs a manual task successfully but begins to struggle when he hears his parents argue; a man who was working out vigorously pretends to struggle when a less competent friend joins him). Responses rated as no or pseudo response; non-contextual; or contextual (correct).	Interpretation
	40 Girls	0%				

Feckzo (1977)	80	51%	10-11	Urban religious schools, middle SES	Feffer's role taking task (Feffer, 1959; Feffer & Gourevitch, 1960) – 2 pictured scenes with 3 characters in real life situations. Asked to tell a story about each picture, then retell from perspective of each character. Scored based on ability to consistently “decenter” attention from impact of previous roles to refocus on new character.	Interpretation
					Empathy Questionnaire – watch video clips of aggressive and prosocial tv shows and circle on a sheet what feeling the character has.	Truth
Zahn-Waxler et al. (1977)	27	50%	3	White, middle SES	Flavell's (1968) perceptual and conceptual role-taking tasks	Truth
Ianotti (1978)	81		4-7			
	30	100%	6	White, middle SES,	Flavell's (1968) role-taking tasks	Truth
	30		9	religious schools	Selman & Byrne (1974) – listen to a story with a moral or hypothetical dilemma and asked how to solve the problem – scored on 6 point classification for role taking (highest if the child understands the difference between a personal belief system and a social system and realizes their effect on behavior)	Interpretation
Ahammer & Murray (1979)	97	49%	4		Told a series of vignettes and asked to indicate to picture of how child felt and how the participant felt.	Truth
					“Cognitive Role-taking” – Three Mountains Task and Cubes task – presented with toys/ displays and asked to rotate them to show what the examiner was able to see. Scored as correct, incorrect (egocentric/ own view), or partial credit for any other rotation.	Truth
Van Tassel (1979)	38	61%	3-6	Lower to middle SES	Cooperative and Prosocial Perspective Taking Task. 9 videotaped episodes, 3 each for cooperating, helping, and sharing. Adult narrated child actor's actions. *scenarios are fairly scripted* - e.g., kids play with blocks, one suggests they combine blocks to build a big tower, the other agrees (cooperating). After describing story (not factored into scoring) – asked what characters thought, felt, and why they acted as they did.	Truth
					Flavell et al (1969) – 1. Choosing a Gift and 2. Picture Story tasks.	Truth
					3. Choosing a Chair: choose chairs for adults and children.	Truth
					4. Cat in the Bush – vignette – asked to name characters' thoughts and feelings based on explicitly stated situational cues.	Truth
					5. Role Behavior of Family Members – asked to identify typical family roles from pictures.	Truth
					6. Recognition of Role Attributes – match pictures to professions.	Truth

					All scored as Scored as correct, incorrect (egocentric/ own view), or partial credit for an incorrect attempt at perspective taking.	
Eisenberg & Lennon (1980)	51		4-5		Stories (relatively scripted) asked to say or point to picture about how the character would feel and how the participant feels.	Truth
Hudson et al. (1982)	18	50%	8	Middle SES, White	Intentions Task (King, 1971) – 4 vignettes where one child falls down, but intent (accident or intentional) and harm (major/ minor) varied with each. Measure ability to differentiate clearly between accident and intent on a 5 pt scale.	Truth
					Feelings Task (Rothenberg, 1970) – videos with husband and wife where feelings change – scored for accurate identification and explanation of feelings. 1-4 for most to least egocentric response.	Interpretation
					Thoughts task (Flavell, 1968) – videos of a boy climbing a tree to get away from a dog or to get an apple; and a girl and friends emptying her closet to find a toy or to clean it. Child narrates the first story of each sequence, then constructs a story that someone seeing only the second story might tell. Scored 1-4 for most to least egocentric response.	Truth
Krebs & Sturup (1982)	24	54%	7-9	Diverse SES	Flavell's (1968) picture storytelling task & dime game (predict another's strategy)	Truth
Hill (1983)	42	45%	3-5	Middle SES	Interview – tell about a recent experience at preschool. Presented with 4 slide stories. e.g., Child wakes up and realizes it's her birthday; one asks to join a game and is rejected. Asked how the character feels, what makes them feel that way, why does it make them feel that way, and how can you tell they feel x.	truth
Kagan & Knudson (1983)	88	57%	5-9	White and Hispanic, lower SES, semirural elementary schools	Modified Affective Situation Test – match feelings with scripted situations (e.g., birthday party = happy; lost dog = sad)	Truth
Blotner & Bearison (1984)	120	100%	4-11	NYC, public school, middle SES	“Perspective Coordination” – Chandler's (1973) Bystander Cartoons. Cartoons where an observer views the main character experiencing a series of events but is unaware of what preceded it whereas the study participant knows. Participant is asked to tell the whole story from the bystander's perspective, from beginning to end, starting with where the bystander enters the scene. Also asked what the bystander thought the main character's motives for his actions were. Interview scores ranged from 0-12 for the 3 stories.	Truth

Froming et al. (1985)	143	50%	6-8	Mid SES, 2/3 White and 1/3 Black	Flavell et al. 1968 picture storytelling task (dog and tree)	Truth
Iannotti (1985)	52	60%	4-6	White, mid SES	Penny Hiding Game: experimenter and then child takes turn guessing which hand has a penny – scored on 10-point scale based on awareness that an individual possesses private information.	Truth
					Flavell's Gift Choice (1968) Selman and Byrne (1974) and Nickel-Dime game Shown a box containing 5 pennies with "5" written on it and another containing 10 pennies with "10" written on it. Child is told that another will guess which box has money in it and has to trick them by taking money out of one box. Next, child is asked to choose between the 5- and 10-boxes left by the previous child who is "trying to trick you." Scored based on perspective taking process when reasoning about decisions, rather than actual solutions. Higher score when a child can reflect on other's decisions.	Truth
Denham (1986)	27	59%	2-3	Mixed SES, predominantly rural	Affective Perspective taking: Puppets and vignettes with vocal and visual affective cues. In 8, the puppet felt as most would, in 6, it felt the opposite than what mothers reported they expected their own child to feel (e.g., some would feel happy or sad to come to day care/ afraid or excited to go to the doctor). Participants were asked to affix the appropriate face to the puppet (how does the puppet feel?).	Truth with elements of interpretation
					False Belief Location task.	Truth
Larrieau & Mussen (1986)	76	45%	10	Upper middle SES	Told 4 stories about a child who acted in prosocial ways (e.g., defending someone being bullied). Asked what the main character might have been thinking when deciding to act that way. Among other things, could obtain 1 score per story where the response involved taking another's perspective of the situation.	Truth
Chapman et al. (1987)	60	50%	4-11	Middle SES	"Prosocial attribution stories" – stories with pictures in a book, in each, a victim suffers distress in presence of a child observer who reacts in different ways, allowing a range of interpretation (Zahn-Waxler, Iannotti, & Chapman, 1982). Asked a series of questions to elicit (1) why the observer acted the way he did, (2) how the observer felt, (3), whether the observer felt that way for himself or for the victim. Answers recorder verbatim. "Because each story allowed for a variety of interpretations, we believed that these attributions would serve as a projective measure of children's own prosocial dispositions" (p. 142) Scored for Empathy, Altruism, Guilt, Aggression, Denial. Empathy score used as affective ToM measure – participants had to	Interpretation

					reason about the observer's affect and behavior in relation to the victim's feelings.	
Horowitz (1989)	59	44%	5-9	Religious school in NYC, middle SES	Perceptual perspective taking. Asked to orient objects for another's perspective. Scored as incorrect, partial, or correct.	truth
					Affective Perspective taking: Interpersonal Awareness Test – attribute emotion (happy, sad, mad, afraid) to the story protagonist.	truth
Strayer & Roberts (1989)	51	53%	6	White Canadians, majority middle SES	“Role-taking” – label a story person's affect and provide a reason that is consistent with the story cues.	truth
Goodman (1990)	28	50%	4-5	Low SES, Black, in public pre-K	Penny Hiding game (DeVries, 1970) Gift choice task (Flavell 1968) Nickel-Dime Game (Flavell, 1968) requiring FB understanding	truth truth
Dunn et al. (1991)	50	46%	T1: 2 T2: 3	Second born siblings, diverse SES	Affective Perspective taking task (Denham 1986) Series of False Belief Tasks (Bartch & Wellman, 1989) – Standard unexpected contents tasks using puppets. Scoring as correct/ incorrect for 4 prediction tasks; 0 or 1 for 5 explanation tasks for inferring puppet's false belief, whether prompted or unprompted.	Truth with elements of interpretation Truth
Cho (1992)	58	41%	3-6	University preschool, 64% white, 24% Asian	Denham's (1986) affective perspective taking task	Truth with elements of interpretation
Dekovic & Gerris (1994)	125	50%	6-11	Netherlands	2 cartoon stories – asked what a character is thinking after being told what the other character is thinking about (differentiation of perspectives); why the main character is having a certain emotional response (perspective taking), why the second character has a certain response (coordination of perspectives). E.g, a girl plays with her ball and it gets ruined, she walks away sadly. She comes across her friend who is playing with a ball and starts to cry. The friend looks surprised.	Truth
Fitzgerald (1994)	93	46%	5-10		Selman's 1980 interview – self and peer-group domains. Self domain: Read a story with a social dilemma (a boy has to decide right away whether to buy his friend a new puppy, who is still sad because his dog ran away. The friend had mentioned earlier that he	Unclear scoring

					“can’t just get a new dog and have things be the same”). Asked a series of yes/ no and open-ended questions about what the boy will do, what he is thinking etc. Some relate to whether a person can look one way and feel another, and whether a character meant what he said.	
					Peer domain: read a story about a boy who has to decide which of two hockey teams to join where he would be an average player on a great team with many perks, or a star player on an average team where his friend plays as well. Asked a series of questions about what the by will choose and why, why he would want to join a group, what might be hard about it etc.	
Lalonde & Chandler (1995)	47	47%	3	University based preschools	Standard false belief tasks: unexpected contents and change - pass/ fail	truth
Garner (1996)	39	41%	9-10	Low SES	Cartoon vignettes with facial emotion cues incongruent with setting cues (e.g., sad girl at happy birthday party). Asked how primary character feels and to justify responses. “emotion role taking”	Truth with elements of interpretation
Moore et al. (1998)	40	50%	3 4	Canadian, diverse SES	Standard fb and representational tasks (what did you think this was before you held it/ opened it? What will your friend think when s/he first sees it?), desire task	
Ouaou (1999) <i>Study 1</i>	56	43%	6-10	White, mid SES	Forced choice response, pass/ fail Flavell’s (1986) Apple-Dog Story	truth
Ouaou (1999) <i>Study 2</i>	36	44%	6-8	White, mid SES	Flavell’s (1986) Apple-Dog Story	truth
Lupinetti (1999)	39 Boys	100%	4	Low to middle SES	Denham’s (1986) affective perspective taking task	Truth with elements of interpretation
	41 Girls	0%				
Simon (2001)	135	53%	3-5	Head Start, low SES, moderately diverse ethnicity	Denham (1986) affective perspective taking task	Truth with elements of interpretation
Randall (2002)	106	54%	3-6	Diverse SES	Affective perspective taking: Shown photos and told a corresponding story. 3 had matching context and emotion expression, and 3 were incongruent. Coded for affect identification (selecting an emotion picture) and explaining the reason for it. Affective attribution coded for congruent stories only. Specific affective reconciliation score for	Truth

					incongruent stories – given a point if response acknowledged incongruent cues and discounted one of them.	
					Cognitive perspective taking: “secret game task” – child and experimenter 1 chooses two toys to think of as their secret while experimenter 2 has her eyes closed. Child is asked a series of questions regarding who knows what the secret is. Correct/incorrect	truth
Slaughter et al. (2002)	78	53%	4-6	Mid SES, Australia	Vignettes with pictures – standard unexpected contents false belief task (Gopnik & Astington, 1988), a desire task (a child’s favorite food is vegetables – do you think the child would want vegetables or candy as a snack?) an emotion task (child wanted socks but gets a toy for his birthday – would he feel happy or sad?) and a version of the Four Sweets task (place 4 chocolate bars in each corner of a picture with the character looking at one bar which is intentionally different from the participant’s favorite. Asked which bar the character would choose).	truth
Cassidy et al. (2003)	67		4-6	US, middle and lower SES, majority White	False belief – standard change of location task and a deception task (participants shown how a puppet hides a marble to make it both easy to find and hard to find. They are then asked to hide it under 2 conditions where a mean or a nice character will be trying to find it. Scored correct if they help the nice guy and make it hard for the mean guy).	Truth
					Denham (1986) Affective Perspective Taking puppets	Truth with elements of interpretation unclear
Fitzgerald & White (2003)	93	46%	6-13	Mid SES, majority White	Selman’s (1980) interpersonal and self-understanding stage interview.	
Liebman (2005)	60	43%	4,6	Majority White, mid to high SES	Read to stories where character was motivated to hide his true feelings. Asked how protagonist looked he felt, how he really felt, and how the other character thought he felt (point to correct pictures)	Truth with elements of interpretation
					FB – unexpected contents, appearance reality distinction (e.g., a box that looked like a book – asked what it looks like and what it really is) – pass/ fail	Truth
Spatz-McNeary (2005)	85	52%	3-5	Middle to upper SES, majority White	Composite of the following tasks: Denham’s (1986) affective perspective taking task Denham’s (1994) generating emotion provoking situations task (doll with emotion faces – asked what made doll feel that way) Appearance – reality of emotion task (Banerjee, 1997)	Truth with elements of interpretation Truth Truth

					Desire-action prediction tasks (Cassidy et al., 2003) – vignette – asked to predict which sticker a character will choose (opposite from what the participant identified as their favorite, and the character's preference was explicitly stated earlier in the story) – pass/fail	Truth
					Standard unexpected contents and change of location tasks – pass/fail	Truth
					Doodles task (Lalonde & Chandler, 1995) – standardized task of multiple false beliefs (what do A and B each think this is a picture of – each character had different information) – pass/fail	
Walker (2005)	111	43%	3-5	Australia	FB: standard change of location and unexpected contents tasks	Truth
Yagmurlu et al. (2005)	201	56%	4-7			
Ruffman et al. (2006)	55	40%	3	Middle and upper SES, New Zealand	Emotion situations task based on Denham (1986), using pictures instead of puppets; emotion situation task (match emotions to stereotypical situations) FB change of location task, desire-emotion task (told a character likes x and not y – asked if s/he feels happy or sad when receiving x and y)	Truth with elements of interpretation
			4		Additional desire-action task (told what a character wants – asked what he would do if he finds/ does not find it – forced choice); unexpected contents; wicked desires – (A does not like B – would A feel happy or sad when he tried to hit B with a ball but missed?); ambiguity task (say whether or not a new person would be able to identify a picture with only part of it showing, after seeing the whole thing themselves).	Truth
Fernandez (2007)	115	50%	4-8	Colombian, lower middle SES	First order scaled ToM tasks (Wellman & Lui, 2004) – story drawings to assess understanding of a person's desires, emotions, & beliefs. All cues provided – pass/ fail.	Truth
					Standard second order ToM – vignettes to infer character A's beliefs about character B's belief – pass/ fail	Truth
Lucas et al. (2008)	35	43%	4-5		Standard unexpected contents	Truth
Renouf et al. (2010)	399	47%	T1: 5 T2: 6	French-Canadian, lower SES	Standard unexpected identity (appearance/ reality distinction) and unexpected contents tasks.	Truth

Dunfield (2010)	86	51%	2-4		Scripted stories- asked how the character would feel. – pass/ fail	Truth
Martin (2010)	70	50%	8-10		Standard 1 st and 2 nd order FB tasks (change of location)	Truth
Eggum et al. (2011)	166	53%	T1: 4.5 T2: 6	Majority white, diverse SES	T1: Denham's (1986) affective tasks (puppets with stereotypical and non-stereotypical emotions); unexpected contents task, FB story task (scripted, all clues given – asked to infer beliefs) – pass/ fail	Truth with elements of interpretation Truth
Knafo et al. (2011)	83	57%	3-6	Jerusalem, middle SES, mainly Jewish	Stories – asked how character feels based on situation cues and facial expression.	Truth
Caputi et al. (2011)	70	56%	T1: 5 T2: 6	Italian, mixed SES, White	FB: Standard unexpected contents and transfer tasks. Second-order FB stories, belief-desire reasoning tasks - scripted, all clues given – asked to infer beliefs) – pass/ fail,	Truth
					ToM Mixed Emotion Understanding (Gordis, Rosen, & Grand, 1989) – stories. Explain set: asked to explain why character felt each of two (explicitly stated) emotions. Infer and Justify: asked to infer and justify characters' feelings. Scored 0, 1 (naming 1 emotion) or 2 (naming 2 opposite valence emotions)	Truth
			T3: 7		Theory of mind test (Pons & Harris, 2002) – vignettes measuring understanding of perspective, intentionality, ignorance, appearance/ reality, lies, jokes, FB, second order FB, double-bluff. Forced choice response, pass/ fail.	Truth
					Test of Emotion Comprehension (Pons & Harris, 2000). Story with picture – participant asked to infer and point to correct emotion. Each based on different conditions of understanding: facial expression, external cause, desires, beliefs, influence of a reminder on present emotional state, capacity to control a felt emotion, capacity to hide an emotion, mixed emotions, and moral emotions. Pass/ fail per item.	Truth
Newton & Jenvey (2011)	66	39%	3-4		Standard 1 st order FB (unexpected contents & change of locations)	Truth
Farrant et al. (2012)	72	47%	4-6	Australia, mid to high SES, majority white	Wellman and Liu's (2004) diverse desire, diverse belief and contents false belief tasks	Truth
					Harwood and Farrar's (2006) emotional perspective taking tasks - emotion labelling task. Then, after identifying his/her best friend, the child is told short stories involving him/herself and the identified friend in situations that would lead to the child and the friend experiencing different emotions (one happy, the other sad), and the child is asked to	truth

					identify how she/he would feel and how the friend would feel (stereotypic situations, e.g., someone steps on the toys and only yours break. How would you feel? How would your friend feel?). Pass/ fail.	
Broeren et al. (2013)	222		4-11	Netherlands, mid SES	Theory of Mind Test ((Muris et al. 1999). Standard vignettes – emotion labeling, first order beliefs, second order beliefs, pretense, FB understanding, understanding humor & sarcasm. Pass/ fail	truth
Longiro et al. (2014)	180	51%	10-11	Italy	Stories (Gini, 2006) – cognitive, emotional, & moral. Scripted vignettes with explicit questions (e.g., where will A look for B and why?; How will X feel and why?) – scored between 0-3 per story (3 for correct with no reference to inner state, 4 for correct with mental state inference)	truth
Wu & Su (2014)	74	46%	2-4	Chinese, urban	Modified ToM tasks (Wellman & Liu, 2004; Wellman et al., 2006) Real-Apparent emotion – relatively scripted vignette (boy expected a gun for his birthday, he gets a boring book – responds by smiling etc) – asked how the boy really felt and how he tried to appear by pointing at faces.	truth
Yagmurlu (2014)	116	61%	4-5	Turkish, diverse SES	Standard FB tasks (change of location, unexpected contents)	truth
Veiga, Neto, & Rieffe (2016)	78	46%	4-6	Portuguese, university affiliated preschool	Standard desire task and 2 FB tasks (change of location, unexpected contents)	truth
Ornaghi et al. (2016)	101		4-6	Italian, middle SES	TEC	truth
Korucu, Selcuk, & Harma (2017)	212		3-6	Turkish, diverse SES	ToM aggregate (Wellman & Liu, 2004) including one hidden emotion task.	truth

**Tasks are labeled as truth-based when all relevant information is explicitly provided and a specific response is considered to be correct. Tasks are labeled as interpretation-based when the child is expected to go beyond the explicitly provided information to interpret a scene. Tasks may be scored within a range or even as correct/ incorrect, based on the *type* of response provided (e.g., one that includes inferences or not), rather than a specific answer.

Appendix I: Theory of Mind and Effortful Control

Study	Participants			ToM Task	Temperament – Effortful Control		Effect
	N	% Boys	Age		Type	Domain(s)	
Izard et al. (1999)	130	51%	6-7	Low SES, Head Start, majority African American	Emotion recognition and labeling – expressions	Parent ratings – BSQ	Behavioral inhibition - .24*

					and situations. Emotion memories – asked to describe situations that caused them to experience joy/ interest and sadness/ fear/ guilt/ shame. – raters judged if situation could elicit that emotion.				-.06
Carlson & Moses (2001)	10 7	48 %	3-4	Majority White, community sample	Standard FB Deceptive Pointing Appearance-reality	Standard performance tasks CBQ	Inhibitory control Inhibitory control	.41* *	.13
Carlson et al. (2004)	81	49 %	T1:2	US, urban, majority White, mid to high SES	Standard ToM aggregate – no FB Intentions Discrepant desires Visual Perspective Comprehension of Pretense Aggregate: Pretend-reality Discrepant Desires Visual Perspective taking Appearance-reality FB	Toddler Behavior Assessment Questionnaire-R CBQ	Effortful control Effortful control	--	
			T2:3						--
Blair & Razza (2007)	17 0	53 %	3	Head Start, majority White, low income	Standard FB	CBQ	Effortful control	.41* *	
Moore et al. (2011)	44	52 %	4	Canada, urban, White, mid SES	Standard FB tasks	Peer play experiment	Onlooker behavior (observing others)	.42*	

Wellman et al. (2011)	14 6	59 %	3.5 (temperament) then 5.5 (ToM)	Longitudinal project – children represented a range of externalizing problem severity	Classic vignette FB tasks	Parent ratings, CBQ	Perceptual sensitivity Attentional focusing	.19* -.05
Lane et al. (2013)	10 2	50 %	3.5- 5	China and US (majority White), middle SES	Standard FB vignettes	Parent ratings, CBQ HPA-axis reactivity (salivary cortisol) CBCL withdrawn	Inhibition Attention shifting	-.10 -.10
Mink et al. (2014)	88	55 %	1.4 (temp) 3 (ToM)	German	Standard FB	ECBQ; CBQ	Attention focusing Inhibitory control	-- --
Brink et al. (2015)	43	-	T1: 10-12mo (temp) T2: 4 (ToM)		Standard FB	Parent child observation protocol	Socially observant temperament (infant made sounds when parent talked to him/ her; was wary of experimenters; pointed to ask or show interest; showed/ gave parent objects)	.27
Korucu, Selcuk, & Harma (2016)	21 2						Perceptual sensitivity Inhibitory control Attention regulation	.06 .22* .13
LaBounty et al. (2016)	34	59 %	3-4	Mid to high SES, majority White	Standard FB vignettes Denham puppets	Parent CBQ, CBCL withdrawn	Attention focusing Low intensity pleasure Inhibitory control “socially observant”	.24 -.06 .36 .50* .45* .39* .43*

							aggregate – 4 items Attention focusing Low intensity pleasure Inhibitory control	
Longobardi et al. (2017)	86	50 %	3-4	Urban, Italian, public schools, mid SES	Standard FB	Parent ratings	Attentional control	.09
	82		4-5					-.01
	86	50 %	3-4	Urban, Italian, public schools, mid SES	TEC (Pons & Harris, 2008)	Parent ratings		.24*
	82		4-5					-.01
Pecora et al. (2017)	69	54 %	T1: 3-4 (ToM) T2: 5-6 (Temp)	Italy, urban, mid SES	Standard FB tasks	CBQ short form	Attentional focusing Inhibitory control	.20 .31*

-- nonsignificant correlations not reported

Appendix J: Theory of Mind and Negative Reactivity

Study	Participants				ToM Task	Temperament – Negative Affectivity		Effect
	N	% Boys	Age	Demographics		Type	Domain(s)	
Garner & Power (1996)	82	54 %	4-5	Middle and high SES, majority White	emotional role- taking (vignettes) – incongruent emotion cues (only had to identify emotions)	Behavior experiment	Negative emotional displays Emotional intensity	.11 .09
Izard et al. (1999)	130	51 %	6-7	Low SES, Head Start, majority African American	Emotion recognition and labeling – expressions and situations	Parent ratings – BSQ	Negative emotionality	-.15

					Emotion memories – asked to describe situations that caused them to experience joy/interest and sadness/fear/guilt/shame. – raters judged if situation could elicit that emotion.				.03
Bennett et al. (2005)	188	50%	T1: 2 T2: 4	US, low SES	Emotion knowledge – labeling, recognition, and situational knowledge	Standardized experiments (Modified strange situation-reunion procedure)	Negative emotionality		.02 -.07
Wellman et al. (2011)	146	59%	3.5 (temperament) then 5.5 (ToM)	Longitudinal project – children represented a range of externalizing problem severity	Classic vignette FB tasks	Parent ratings, CBQ	Fearfulness		.00
Mink et al. (2014)	88	55%	1.4 (temp) 3 (ToM)	German	Standard FB	ECBQ; CBQ	Fear Frustration/Anger		-- --
LaBounty et al. (2016)	34	59%	3-4	Mid to high SES, majority White	Standard FB vignettes	Parent CBQ, CBCL withdrawn CBQ	Fearfulness		.03
Song et al. (2016)	241		T1: 3	At risk for conduct problems, diverse SES, majority White	Standard FB tasks		Fearful /Inhibited (combined Shyness and Fearfulness scales)		.03

Longobardi et al. (2017)	86	50 %	3-4	Urban, Italian, public schools, mid SES	Classic FB change of locations task TEC (Pons & Harris, 2008)	Parent ratings (Behavioral Style Questionnaire)	Negative dominant emotion	.01
	82		4-5					-.16
	86		3-4					.07
	82		4-5					-.05
Pecora et al. (2017)	69	54 %	T1: 3-4 (ToM)	Italy, urban, mid SES	Standard FB tasks	CBQ short form	Fear Frustration/Anger	.19
			T2: 5-6 (Temp)					-.24

Appendix K: TAT Administration Protocol

Children will be asked to tell a story about eight picture cards from the TAT set (Cards 1, 2, 3BM, 5, 7GF, 13B). Children's responses and Interviewer prompts will be audio taped and transcribed verbatim.

Instructions: *"I am going to show you some pictures, one at a time, and I would like you to make up a story for each card. In your story, be sure to tell what is happening in the picture, what has happened before, what the characters are thinking and feeling, and then give an ending. In other words, you are going to tell a complete story with a beginning, middle, and end. I will write down your stories exactly as you tell them and tape record them so that I don't miss anything. Are you ready? Here's the first card."*

Allowable prompts:

1. *What happened before?* (BF?)
2. *What is he/she thinking?* (T?)
3. *How is he/she feeling?* (F?)
4. *...and then what happened?*
5. *How does it all turn out in the end?* (TO?)

If the child has difficulty getting started, you might encourage by simply saying, "Tell me a story about this picture." If more is needed, you might say, "Tell me what you think might be happening in this picture".

Appendix L: M-Plus Syntax

TITLE: MODEL 1

VARIABLE:

NAMES = PARTICIPANT, AGE, SCHOOL, WEIGHT, EC, NA, NEPSY, TAT, SC;
USEV = AGE, SCHOOL, WEIGHT, EC, NEPSY, TAT, SC;
CLUSTER = SCHOOL;
WEIGHT = WEIGHT;

ANALYSIS:

TYPE = COMPLEX;
ESTIMATOR = ML;
BOOTSTRAP = 5000;
REPSE = BOOTSTRAP;

MODEL:

SC ON EC NEPSY TAT AGE;
NEPSY TAT ON EC;
NEPSY TAT ON AGE;
EC ON AGE;

MODEL INDIRECT:

SC IND NEPSY EC;
SC IND TAT EC;

OUTPUT:

cinterval (BCBOOTSTRAP);
stdyx;

TITLE: MODEL 2

DEFINE:

NAxEC = NA*EC;

VARIABLE:

NAMES = PARTICIPANT, AGE, SCHOOL, WEIGHT, EC, NA, NEPSY, TAT, SC;
USEV = AGE, SCHOOL, WEIGHT, EC, NA, TAT, SC, NAxEC;
CLUSTER = SCHOOL;
WEIGHT = WEIGHT;

ANALYSIS:

```
Type = COMPLEX;  
Estimator = ML;  
Bootstrap = 5000;  
REPSE = BOOTSTRAP;
```

MODEL:

```
SC ON TAT AGE (b2);  
TAT ON NA AGE (b1);  
TAT ON EC AGE (b3);  
TAT ON NAxEC AGE (b4);
```

MODEL CONSTRAINT:

```
New(b2b4 b1b2 ss1 ss2 ss3);  
b2b4 = b2*b4; ! Look at 95% CI to test for moderation  
b1b2 = b1*b2; ! If b2b4 excludes zero, use this as the indirect effect  
! However, if b2b4 CI excludes zero, then you use these simple slopes  
ss1 = b1*b2+b2*b4*(2); ! Indirect effect of x at -1SD below mean of z variable  
ss2 = b1*b2+b2*b4*(4); ! Indirect effect of x at mean of z variable  
ss3 = b1*b2+b2*b4*(6); ! Indirect effect of x +1SD above mean of z variable
```

MODEL INDIRECT:

```
SC IND TAT NA;
```

OUTPUT:

```
Sampstat Cinterval(bootstrap);  
stdyx;
```

Bibliography

- Abramson, L., Paz, Y., & Knafo-Noam, A. (2019). From negative reactivity to empathic responding: Infants high in negative reactivity express more empathy later in development, with the help of regulation. *Developmental science*, 22(3), e12766.
- Acar, I. H. (2016). *Examining the roles of child temperament, home, and classroom environments on low income preschool children's self-regulation*. (Unpublished Doctoral Dissertation). The University of Nebraska-Lincoln.
- Achenbach, T. M. (1992). *Manual for the Child Behavior Checklist/2-3 and 1992 profile*. Department of Psychiatry, University of Vermont.
- Achenbach, T. M., McConaughy, S. H., & Howell, C. T. (1987). Child/adolescent behavioral and emotional problems: implications of cross-informant correlations for situational specificity. *Psychological bulletin*, 101(2), 213.
- Ahadi, S. A., Rothbart, M. K., & Ye, R. (1993). Children's temperament in the US and China: Similarities and differences. *European Journal of Personality*, 7(5), 359-378.
- Ahammer, I. M., & Murray, J. P. (1979). Kindness in the kindergarten: The relative influence of role playing and prosocial television in facilitating altruism. *International Journal of Behavioral Development*, 2, 133–157.
<http://dx.doi.org/10.1177/016502547900200203>
- Annoti, L. A., & Teglas, H. (2017). Functioning in the real world: Using storytelling to improve validity in the assessment of executive functions. *Journal of personality assessment*, 99(3), 254-264.

- Astington, J. W. (2003). Sometimes necessary, never sufficient: False-belief understanding and social competence.
- Astington, J. W., & Edward, M. J. (2010). The development of theory of mind in early childhood. *Encyclopedia on early childhood development*, 1-6.
- Astington, J. W., Pelletier, J., & Homer, B. (2002). Theory of mind and epistemological development: The relation between children's second-order false-belief understanding and their ability to reason about evidence. *New ideas in Psychology*, 20(2-3), 131-144.
- Banerjee, M. (1997). Hidden emotions: Preschoolers' knowledge of appearance-reality and emotion display rules. *Social cognition*, 15(2), 107-132.
- Bartsch, K., & Wellman, H. (1989). Young children's attribution of action to beliefs and desires. *Child development*, 946-964.
- Bassan-Diamond, L. E., Teglasi, H., & Schmitt, P. V. (1995). Temperament and a story-telling measure of self-regulation. *Journal of Research in Personality*, 29(1), 109-120.
- Battistich, V., Solomon, D., Watson, M., Solomon, J., & Schaps, E. (1989). Effects of an elementary school program to enhance prosocial behavior on children's cognitive-social problem-solving skills and strategies. *Journal of Applied Developmental Psychology*, 10(2), 147-169.
- Bellagamba, F., Addessi, E., Focaroli, V., Pecora, G., Maggiorelli, V., Pace, B., & Paglieri, F. (2015). False belief understanding and “cool” inhibitory control in 3- and 4-years-old Italian children. *Frontiers in Psychology*, 6, 872.

- Belsky, J., Friedman, S. L., & Hsieh, K. H. (2001). Testing a core emotion-regulation prediction: Does early attentional persistence moderate the effect of infant negative emotionality on later development?. *Child Development*, 72(1), 123-133.
- Bennett, D. S., Bendersky, M., & Lewis, M. (2005). Antecedents of emotion knowledge: Predictors of individual differences in young children. *Cognition & Emotion*, 19(3), 375–396.
- Berdan, L. E., Keane, S. P., & Calkins, S. D. (2008). Temperament and externalizing behavior: Social preference and perceived acceptance as protective factors. *Developmental psychology*, 44(4), 957.
- Blair, C. (2002). School readiness: Integrating cognition and emotion in a neurobiological conceptualization of children's functioning at school entry. *American psychologist*, 57(2), 111.
- Blair, C., & Razza, R. P. (2007). Relating effortful control, executive function, and false belief understanding to emerging math and literacy ability in kindergarten. *Child development*, 78(2), 647-663.
- Blair, K. A., Denham, S. A., Kochanoff, A., & Whipple, B. (2004). Playing it cool: Temperament, emotion regulation, and social behavior in preschoolers. *Journal of school psychology*, 42(6), 419-443.
- Blotner, R., & Bearison, D. J. (1984). Developmental consistencies in socio-moral knowledge: Justice reasoning and altruistic behavior. *Merrill-Palmer Quarterly*, 30, 349–367.
- Bowlby, J (1969). Attachment and loss: Vol. 1. Attachment. New York: Basic Books.

- Bretherton, I., & Beeghly, M. (1982). Talking about internal states: The acquisition of an explicit theory of mind. *Developmental psychology*, 18(6), 906.
- Broeren, S., Muris, P., Diamantopoulou, S., & Baker, J. R. (2013). The course of childhood anxiety symptoms: Developmental trajectories and child-related factors in normal children. *Journal of Abnormal Child Psychology*, 41, 81–95.
<http://dx.doi.org/10.1007/s10802-012-9669-9>
- Brooks, B. L., Sherman, E. M., & Strauss, E. (2009). NEPSY-II: A developmental neuropsychological assessment. *Child Neuropsychology*, 16(1), 80-101.
- Bruner, J. (1987). Life as narrative. *Social research*, 51(1), 11-32
- Buck, R. (1975). Nonverbal communication of affect in children. *Journal of Personality and Social Psychology*, 31(4), 644.
- Buck, R. (1975). Nonverbal communication of affect in children. *Journal of Personality and Social Psychology*, 31(4), 644.
- Buttelmann, D., Carpenter, M., & Tomasello, M. (2009). Eighteen-month-old infants show false belief understanding in an active helping paradigm. *Cognition*, 112(2), 337-342.
- Caputi, M., Lecce, S., Pagnin, A., & Banerjee, R. (2012). Longitudinal effects of theory of mind on later peer relations: The role of prosocial behavior. *Developmental Psychology*, 48, 257–270. <http://dx.doi.org/10.1037/a0025402>
- Carlson, S. M., & Moses, L. J. (2001). Individual differences in inhibitory control and children's theory of mind. *Child development*, 72(4), 1032-1053.

- 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(4), 299-319.
- Caspi, A., & Moffitt, T. E. (1995). The continuity of maladaptive behavior: From description to understanding in the study of antisocial behavior.
- Cassidy, K. W., Stetson Werner, R., Rourke, M., & Zubernis, L. S. (2003). The relationship between psychological understanding and positive social behaviors. *Social Development*, 12, 198–221. <http://dx.doi.org/10.1111/1467-9507.00229>
- Cassidy, K. W., Werner, R. S., Rourke, M., Zubernis, L. S., & Balaraman, G. (2003). The relationship between psychological understanding and positive social behaviors. *Social Development*, 12(2), 198-221.
- Cavell, T. A. (1990). Social adjustment, social performance, and social skills: A tri-component model of social competence. *Journal of clinical child psychology*, 19(2), 111-122.
- Chandler, M. J. (1973). Egocentrism and antisocial behavior: The assessment and training of social perspective-taking skills. *Developmental Psychology*, 9(3), 326-332. <https://doi.org/10.1037/h0034974>
- Chapman, M., Zahn-Waxler, C., Cooperman, G., & Iannotti, R. (1987). Empathy and responsibility in the motivation on children's helping. *Developmental Psychology*, 23, 140–145. <http://dx.doi.org/10.1037/0012-1649.23.1.140>
- Chasiotis, A., Kiessling, F., Hofer, J., & Campos, D. (2006). Theory of mind and inhibitory control in three cultures: Conflict inhibition predicts false belief

- understanding in Germany, Costa Rica and Cameroon. *International Journal of Behavioral Development*, 30(3), 249-260.
- Chen, N., Deater-Deckard, K., & Bell, M. A. (2014). The role of temperament by family environment interactions in child maladjustment. *Journal of abnormal child psychology*, 42(8), 1251-1262.
- Chess, S., & Thomas, A. (1977). Temperamental individuality from childhood to adolescence. *Journal of the American Academy of Child Psychiatry*, 16(2), 218-226.
- Cho, E.-J. (1992). *The role of perspective-taking and empathy in preschoolers' prosocial behaviour* (Unpublished doctoral dissertation). University of Maryland, College Park, MD.
- Coplan, R. J., & Bullock, A. (2012). Temperament and peer relationships.
- Coplan, R. J., Schneider, B. H., Ooi, L. L., & Hipson, W. E. (2018). Peer-based interventions for behaviorally inhibited, socially withdrawn, and socially anxious children.
- Crick, N. R., & Dodge, K. A. (1994). A review and reformulation of social information-processing mechanisms in children's social adjustment. *Psychological bulletin*, 115(1), 74.
- Cronbach, L.J. (1960). *Essentials of Psychological Testing* (2nd Edition). New York: Harper.
- Cutting, A. L., & Dunn, J. (1999). Theory of mind, emotion understanding, language, and family background: Individual differences and interrelations. *Child development*, 70(4), 853-865.

- D'Esterre, A. P., Rizzo, M. T., & Killen, M. (2019). Unintentional and intentional falsehoods: The role of morally relevant theory of mind. *Journal of experimental child psychology*, 177, 53-69.
- De Los Reyes, A., & Kazdin, A. E. (2005). Informant discrepancies in the assessment of childhood psychopathology: a critical review, theoretical framework, and recommendations for further study. *Psychological bulletin*, 131(4), 483.
- Dekovic, M., & Gerris, J. R. M. (1994). Developmental analysis of social cognitive and behavioural differences between popular and rejected children. *Journal of Applied Developmental Psychology*, 15, 367–386.
- Denham, S. (1986). Social cognition, prosocial behavior, and emotion in preschoolers: Contextual validation. *Child Development*, 57, 194–201.
<http://dx.doi.org/10.2307/1130651>
- Denham, S. A., & Couchoud, E. A. (1990). Young preschoolers' understanding of emotions. *Child Study Journal*, 20(3), 171-192.
- Denham, S. A., & Weissberg, R. P. (2004). Social-emotional learning in early childhood: What we know and where to go from here. In E. Chesebrough, P. King, TP Gullota, & M. Bloom (Eds.), *A blueprint for the promotion of prosocial behavior in early childhood* (pp. 1351). *New York: Kluwer/Plenum*.
- Denham, S. A., Blair, K. A., DeMulder, E., Levitas, J., Sawyer, K., Auerbach–Major, S., & Queenan, P. (2003). Preschool emotional competence: Pathway to social competence? *Child development*, 74(1), 238-256.

- Denham, S. A., McKinley, M., Couchoud, E. A., & Holt, R. (1990). Emotional and behavioral predictors of preschool peer ratings. *Child development*, 61(4), 1145-1152.
- Denham, S. A., Zoller, D., & Couchoud, E. A. (1994). Socialization of preschoolers' emotion understanding. *Developmental psychology*, 30(6), 928.
- Derryberry, D., & Rothbart, M. K. (1984). Emotion, attention, and temperament. *Emotions, cognition, and behavior*, 132-166.
- Derryberry, D., & Rothbart, M. K. (1988). Arousal, affect, and attention as components of temperament. *Journal of personality and social psychology*, 55(6), 958.
- DeVellis, R.F. (1991) Scale Development: Theory and Applications: Thousand Oaks, CA. US: Sage Publications, Inc.
- Digman, J. M. (1997). Higher-order factors of the Big Five. *Journal of personality and social psychology*, 73(6), 1246.
- Dirks, M. A., Treat, T. A., & Weersing, V. R. (2007). Integrating theoretical, measurement, and intervention models of youth social competence. *Clinical psychology review*, 27(3), 327-347.
- Dodge, K. A. (1986). A social information processing model of social competence in children. In *Cognitive perspective on children's social and behavioral development: The Minnesota Symposia on Child Psychology* (Vol. 18, pp. 77-125).
- Dodge, K. A. (2006). Translational science in action: Hostile attributional style and the development of aggressive behavior problems. *Development and psychopathology*, 18(3), 791.

- Dodge, K. A., & Somberg, D. R. (1987). Hostile attributional biases among aggressive boys are exacerbated under conditions of threats to the self. *Child development*, 213-224.
- Dollar, J. M., & Stifter, C. A. (2012). Temperamental surgency and emotion regulation as predictors of childhood social competence. *Journal of Experimental Child Psychology*, 112(2), 178-194.
- Dollar, J. M., Perry, N. B., Calkins, S. D., Keane, S. P., & Shanahan, L. (2018). Temperamental anger and positive reactivity and the development of social skills: implications for academic competence during preadolescence. *Early education and development*, 29(5), 747-761.
- Dougherty, L. R. (2006). Children's emotionality and social status: A meta-analytic review. *Social Development*, 15(3), 394-417.
- Dunfield, K. A. (2010). *Redefining prosocial behaviour: The production of helping, sharing, and comforting acts in human infants and toddlers* (Unpublished doctoral dissertation). Queen's University, Kingston, Ontario, Canada.
- Dunn, J., Brown, J., Slomkowski, C., Tesla, C., & Youngblade, L. (1991). Young children's understanding of other people's feelings and beliefs: Individual differences and their antecedents. *Child Development*, 62, 1352–1366.
<http://dx.doi.org/10.2307/1130811>
- Dvash, J., & Shamay-Tsoory, S. B. (2014). Theory of mind and empathy as multidimensional constructs: Neurological foundations. *Topics in Language Disorders*, 34, 282–295.

- Eggum, N. D., Eisenberg, N., Kao, K., Spinrad, T. L., Bolnick, R., Hofer, C., . . .
- Fabricius, W. V. (2011). Emotion understanding, theory of mind, and prosocial orientation: Relations over time in early childhood. *The Journal of Positive Psychology, 6*, 4–16. <http://dx.doi.org/10.1080/17439760.2010.536776>
- Eisenberg-Berg, N., & Lennon, R. (1980). Altruism and the assessment of empathy in the preschool years. *Child Development, 51*, 552–557.
- Eisenberg, N., & Fabes, R. A. (2006). Emotion Regulation and Children's Socioemotional Competence.
- Eisenberg, N., & Lennon, R. (1980). Altruism and the assessment of empathy in the preschool years. *Child Development, 51*, 552–557.
<http://dx.doi.org/10.2307/1129290>
- Eisenberg, N., Fabes, R. A., Bernzweig, J., Karbon, M., Poulin, R., & Hanish, L. (1993). The relations of emotionality and regulation to preschoolers' social skills and sociometric status. *Child development, 64*(5), 1418–1438.
- Eisenberg, N., Fabes, R. A., Guthrie, I. K., & Reiser, M. (2000). Dispositional emotionality and regulation: their role in predicting quality of social functioning. *Journal of personality and social psychology, 78*(1), 136.
- Eisenberg, N., Gershoff, E. T., Fabes, R. A., Shepard, S. A., Cumberland, A. J., Losoya, S. H., ... & Murphy, B. C. (2001). Mother's emotional expressivity and children's behavior problems and social competence: Mediation through children's regulation. *Developmental psychology, 37*(4), 475.
- Eisenberg, N., Smith, C. L., & Spinrad, T. L. (2011). Effortful control: Relations with emotion regulation, adjustment, and socialization in childhood.

- Eisenberg, N., Vaughan, J. U. L. I. E., & Hofer, C. (2009). Temperament, self-regulation, and peer social competence. *Handbook of peer interactions, relationships, and groups*, 473-489.
- Eisenberg, N., Wentzel, M., & Harris, J. D. (1998). The role of emotionality and regulation in empathy-related responding. *School Psychology Review*, 27(4), 506-521.
- Farrant, B. M., Devine, T. A. J., Maybery, M. T., & Fletcher, J. (2012). Empathy, perspective taking and prosocial behavior: The importance of parenting practices. *Infant and Child Development*, 21, 175–188. <http://dx.doi.org/10.1002/icd.740>
- Feckzo, M. D. (1977). *An evaluation of perspective-taking ability: Its effects on television-mediated prosocial behaviors* (Unpublished doctoral dissertation). Loyola University of Chicago, Chicago, IL.
- Feffer M. H. (1959). The cognitive implications of role taking behavior. *Journal of personality*, 27(2), 152–168. <https://doi.org/10.1111/j.1467-6494.1959.tb01826.x>
- Feffer, M.H. and Gourevitch, V. (1960), Cognitive aspects of role-taking in children1. *Journal of Personality*, 28: 383-396. doi:[10.1111/j.1467-6494.1960.tb01627.x](https://doi.org/10.1111/j.1467-6494.1960.tb01627.x)
- Fernandez, C. (2007). *The role of theory of mind and pragmatic language skills in children's social functioning* (Unpublished doctoral dissertation). New York University, New York, NY.
- Fink, E., Begeer, S., Hunt, C., & Rosnay, M. (2014). False-Belief Understanding and Social Preference Over the First 2 Years of School: A Longitudinal Study. *Child development*, 85(6), 2389-2403.

- Fitzgerald, D. P. (1994). *Linking children's social worlds: The relationship of perspective-taking to parent-child and peer contexts* (Unpublished doctoral dissertation). University of Notre Dame, Notre Dame, IN.
- Fitzgerald, D. P., & White, K. J. (2003). Linking children's social worlds: Perspective-taking in parent-child and peer contexts. *Social Behavior and Personality*, 31, 509–522. <http://dx.doi.org/10.2224/sbp.2003.31.5.509>
- Flavell, J. H. (1968). The development of role-taking and communication skills in children.
- Froming, W. J., Allen, L., & Jensen, R. (1985). Altruism, role-taking, and self-awareness: The acquisition of norms governing altruistic behaviour. *Child Development*, 56, 1223–1228. <http://dx.doi.org/10.2307/1130237>
- Gallagher, S., & Hutto, D. D. (2008). Understanding others through primary interaction and narrative practice. In J. Zlatev, T.P. Racine, C. Sinha, & E. Itkonen (Eds.), *The shared mind: Perspectives on intersubjectivity* (pp. 17–38). Amsterdam: John Benjamins
- Garner, P. W. (1996). The relations of emotional role taking, affective/moral attributions, and emotional display rule knowledge to low-income school-age children's social competence. *Journal of Applied Developmental Psychology*, 17, 19–36. [http://dx.doi.org/10.1016/S0193-3973\(96\)90003-9](http://dx.doi.org/10.1016/S0193-3973(96)90003-9)
- Garner, P. W., & Power, T. G. (1996). Preschoolers' emotional control in the disappointment paradigm and its relation to temperament, emotional knowledge, and family expressiveness. *Child Development*, 67(4), 1406–1419.

- Gartstein, M. A., Putnam, S. P., & Rothbart, M. K. (2012). Etiology of preschool behavior problems: Contributions of temperament attributes in early childhood. *Infant Mental Health Journal*, 33(2), 197-211.
- Gini, G. (2006). Social cognition and moral cognition in bullying: What's wrong? *Aggressive Behavior*, 32, 528–539.
- Goff, M., & Ackerman, P. L. (1992). Personality-intelligence relations: Assessment of typical intellectual engagement. *Journal of Educational Psychology*, 84(4), 537.
- Goldberg, L. R. (1990). An alternative" description of personality": the big-five factor structure. *Journal of personality and social psychology*, 59(6), 1216.
- Goldsmith, H. H., Buss, A. H., Plomin, R., Rothbart, M. K., Thomas, A., Chess, S., ... & McCall, R. B. (1987). Roundtable: What is temperament? Four approaches. *Child development*, 505-529.
- Gomes, L., & Livesey, D. (2008). Exploring the link between impulsivity and peer relations in 5-and 6-year-old children. *Child: care, health and development*, 34(6), 763-770.
- Goodman, P. C. (1990). *Prosocial behavior, perspective-taking, and empathy of black socioeconomically deprived preschoolers: Naturalistic and formal evaluations* (Unpublished doctoral dissertation). Texas Woman's University, Denton, TX.
- Gopnik, A., & Astington, J. (1988) Children's understanding of representational change and its relation to the understanding of false belief and the appearance–reality distinction. *Child Development*, 59, 26–37

- Gordis, F. W., Rosen, A. B., & Grand, S. (1989, April). Young children's understanding of simultaneous conflicting emotions. Paper presented at the biennial meeting of the Society for Research in Child Development. Kansas City, MO.
- Green, S. K. (1975). *Causal attribution of emotion and its relationship to role taking and helping behavior in children* (Unpublished doctoral dissertation). Loyola University of Chicago, Chicago, IL.
- Greenberg, J. R., & Mitchell, S. A. (1983). Psychoanalysis and object relations theory.
- Gresham, F. M., & Lambros, K. M. (1998). Behavioral and functional assessment. In *Handbook of child behavior therapy* (pp. 3-22). Springer, Boston, MA.
- Gresham, F. M., Elliott, S. N., Vance, M. J., & Cook, C. R. (2011). Comparability of the Social Skills Rating System to the Social Skills Improvement System: Content and psychometric comparisons across elementary and secondary age levels. *School Psychology Quarterly*, 26(1), 27.
- Gresham, F., & Elliott, S. N. (2008). Social skills improvement system (SSIS) rating scales. *Bloomington, MN: Pearson Assessments*.
- Grist, C. L., & McCord, D. M. (2010). Individual differences in preschool children: Temperament or personality?. *Infant and Child Development: An International Journal of Research and Practice*, 19(3), 264-274.
- Grueneisen, S., Wyman, E., & Tomasello, M. (2015). "I know you don't know I know..." Children use second-order false-belief reasoning for peer coordination. *Child development*, 86(1), 287-293.
- Gunnar, M. R., Sebanc, A. M., Tout, K., Donzella, B., & Van Dulmen, M. M. (2003). Peer rejection, temperament, and cortisol activity in preschoolers. *Developmental*

Psychobiology: The Journal of the International Society for Developmental Psychobiology, 43(4), 346-368.

Hadwin, J., & Perner, J. (1991). Pleased and surprised: Children's cognitive theory of emotion. *British Journal of Developmental Psychology*, 9(2), 215-234.

Hamre & Pianta, 2001; Ladd & Burgess, 1999; Ladd, Herald, & Kochel, 2006

Hamre, B. K., & Pianta, R. C. (2001). Early teacher–child relationships and the trajectory of children's school outcomes through eighth grade. *Child development*, 72(2), 625-638.

Harman, C., Rothbart, M. K., & Posner, M. I. (1997). Distress and attention interactions in early infancy. *Motivation and Emotion*.

Harris, P. L., Donnelly, K., Guz, G. R., & Pitt-Watson, R. (1986). Children's understanding of the distinction between real and apparent emotion. *Child development*, 895-909.

Harris, P. L., Johnson, C. N., Hutton, D., Andrews, G., & Cooke, T. (1989). Young children's theory of mind and emotion. *Cognition & Emotion*, 3(4), 379-400.

Harris, P. L., Olthof, T., Terwogt, M. M., & Hardman, C. E. (1987). Children's knowledge of the situations that provoke emotion. *International Journal of Behavioral Development*, 10(3), 319-343.

Harwood, M. D., & Farrar, M. (2006). Conflicting emotions: The connection between affective perspective taking and theory of mind. *British Journal of Developmental Psychology*, 24(2), 401–418.

Hay, D. F., Payne, A., & Chadwick, A. (2004). Peer relations in childhood. *Journal of child psychology and psychiatry*, 45(1), 84-108.

- Hayes, A. F. (2017). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach*. Guilford publications.
- Hayes, A. F., & Scharkow, M. (2013). The Relative Trustworthiness of Inferential Tests of the Indirect Effect in Statistical Mediation Analysis: Does Method Really Matter? *Psychological Science*, 24(10), 1918–1927.
- Henderson, H. A., Green, E. S., & Wick, B. L. (2018). The social world of behaviorally inhibited children: A transactional account. In *Behavioral inhibition* (pp. 135-155). Springer, Cham.
- Hill, T. C. (1983). *The effect of self-reflection on preschool children's empathic understanding and prosocial behavior* (Unpublished doctoral dissertation). University of Illinois at Urban-Champaign, Urban-Champaign, IL.
- Horowitz, J. A. (1989). *Perspective-taking and prosocial moral reasoning: Their relationship to prosocial moral behavior in children* (Unpublished doctoral dissertation). Pace University, New York, NY.
- Hubbard, J. A., & Coie, J. D. (1994). Emotional correlates of social competence in children's peer relationships. *Merrill-Palmer Quarterly* (1982-), 1-20.
- Hudson, L. M., Forman, E. A., & Brion-Meisels, S. (1982). Role taking as a predictor of prosocial behavior in cross-age tutors. *Child Development*, 53, 1320–1329.
<http://dx.doi.org/10.2307/1129022>
- Hughes, C., & Cutting, A. L. (1999). Nature, nurture, and individual differences in early understanding of mind. *Psychological Science*, 10(5), 429-432.

- Hughes, C., & Dunn, J. (1998). Understanding mind and emotion: Longitudinal associations with mental-state talk between young friends. *Developmental psychology*, 34(5), 1026.
- Hughes, C., Jaffee, S. R., Happé, F., Taylor, A., Caspi, A., & Moffitt, T. E. (2005). Origins of individual differences in theory of mind: from nature to nurture? *Child development*, 76(2), 356-370.
- Hughes, C., Marks, A., Ensor, R., & Lecce, S. (2010). A longitudinal study of conflict and inner state talk in children's conversations with mothers and younger siblings. *Social Development*, 19(4), 822-837.
- Hymel, S., & Franke, S. (1985). Children's peer relations: Assessing self-perceptions. In *Children's peer relations: Issues in assessment and intervention* (pp. 75-91). Springer, New York, NY.
- Iannotti, R. J. (1978). Effect of role-taking experiences on role taking, empathy, altruism, and aggression. *Developmental Psychology*, 14, 119–124.
<http://dx.doi.org/10.1037/0012-1649.14.2.119>
- Iannotti, R. J. (1985). Naturalistic and structured assessments of prosocial behavior in preschool children: The influence of empathy and perspective taking. *Developmental Psychology*, 21, 46–55. <http://dx.doi.org/10.1037/0012-1649.21.1.46>
- Imuta, K., Henry, J. D., Slaughter, V., Selcuk, B., and Ruman, T. (2016). Theory of mind and prosocial behavior in childhood: a meta-analytic review. *Dev. Psychol.* 52, 1192–1205.

- Izard, C. E., Schultz, D., Fine, S. E., Youngstrom, E., & Ackerman, B. P. (1999). Temperament, cognitive ability, emotional knowledge, and adaptive social behavior. *Imagination, Cognition and Personality*, 19(4), 305–330.
- Jenkins, J. M., & Ball, S. (2000). Distinguishing between negative emotions: Children's understanding of the social-regulatory aspects of emotion. *Cognition & Emotion*, 14(2), 261-282.
- Johnson, D. W. (1975a). Affective perspective taking and cooperative predisposition. *Developmental Psychology*, 11, 869–870. <http://dx.doi.org/10.1037/0012-1649.11.6.869>
- Johnson, D. W. (1975b). Cooperativeness and social perspective taking. *Journal of Personality and Social Psychology*, 31, 241–244. <http://dx.doi.org/10.1037/h0076285>
- Kagan, S., & Knudson, K. A. M. (1983). Differential development of affective role-taking ability and prosocial behavior. *The Journal of Genetic Psychology*, 143, 97–102. <http://dx.doi.org/10.1080/00221325.1983.10533538>
- Keller, P. S., El-Sheikh, M., Granger, D. A., & Buckhalt, J. A. (2012). Interactions between salivary cortisol and alpha-amylase as predictors of children's cognitive functioning and academic performance. *Physiology & behavior*, 105(4), 987-995.
- Killen, M., Mulvey, K. L., Richardson, C., Jampol, N., & Woodward, A. (2011). The accidental transgressor: Morally-relevant theory of mind. *Cognition*, 119(2), 197-215.

- Kim, J., & Cicchetti, D. (2010). Longitudinal pathways linking child maltreatment, emotion regulation, peer relations, and psychopathology. *Journal of child psychology and psychiatry*, 51(6), 706-716.
- King, M. (1971). The development of some intention concepts in young children. *Child Development*, 42(4), 1145–1152. <https://doi.org/10.2307/1127799>
- Knafo, A., Steinberg, T., & Goldner, I. (2011). Children's low affective perspective-taking ability is associated with low self-initiated prosociality. *Emotion*, 11, 194–198. <http://dx.doi.org/10.1037/a0021240>
- Kochanska, G., & Aksan, N. (2006). Children's conscience and self-regulation. *Journal of Personality*, 74(6), 1587-1618.
- Kochanska, G., DeVet, K., Goldman, M., Murray, K., & Putnam, S. P. (1994). Maternal reports of conscience development and temperament in young children. *Child development*, 65(3), 852-868.
- Kolak, A. M., Frey, T. J., Brown, C. A., & Vernon-Feagans, L. (2013). Minor illnesses, temperament, and toddler social functioning. *Early Education & Development*, 24(8), 1232-1244.
- Korkman, M., Kirk, U., & Kemp, S. (2007). NEPSY-II: Clinical and interpretive manual. San Antonio, TX: The Psychological Corporation.
- Korucu, I., Selcuk, B., & Harma, M. (2017). Self-regulation: Relations with theory of mind and social behaviour. *Infant and Child Development*, 26(3), e1988.
- Krebs, D., & Sturup, B. (1974). Role-taking ability and altruistic behavior in elementary school children. *Proceedings of the Division of Personality and Society Psychology*, 1(1), 407–409. <https://doi.org/10.1177/0146167274001001137>

- Krebs, D., & Sturupp, B. (1982). Role-taking ability and altruistic behaviour in elementary school children. *Journal of Moral Education*, 11, 94–100.
<http://dx.doi.org/10.1080/0305724820110204>
- Kujawa, A. J., Torpey, D., Kim, J., Hajcak, G., Rose, S., Gotlib, I. H., & Klein, D. N. (2011). Attentional biases for emotional faces in young children of mothers with chronic or recurrent depression. *Journal of abnormal child psychology*, 39(1), 125-135.
- LaBounty, J., Bosse, L., Savicki, S., King, J., & Eisenstat, S. (2016). Relationship between social cognition and temperament in preschool-aged children. *Infant and Child Development*, 26(2), e1981.
- Ladd, G. W., Herald, S. L., & Kochel, K. P. (2006). School readiness: Are there social prerequisites?. *Early education and development*, 17(1), 115-150.
- Lalonde, C. E., & Chandler, M. J. (1995). False belief understanding goes to school: On the social-emotional consequences of coming early or late to a first theory of mind. *Cognition & Emotion*, 9(2-3), 167-185.
- Lane, J. D., Wellman, H. M., Olson, S. L., Miller, A. L., Wang, L., & Tardif, T. (2013). Relations between temperament and theory of mind development in the United States and China: Biological and behavioral correlates of preschoolers' false-belief understanding. *Developmental Psychology*, 49, 823–836.
- Larrieu, J., & Mussen, P. (1986). Some personality and motivational correlates of children's prosocial behavior. *The Journal of Genetic Psychology*, 147, 529–542.
<http://dx.doi.org/10.1080/00221325.1986.9914528>

- Lemerise, E. A., & Arsenio, W. F. (2000). An integrated model of emotion processes and cognition in social information processing. *Child development*, 71(1), 107-118.
- Lemery, K. S., Essex, M. J., & Smider, N. A. (2002). Revealing the relation between temperament and behavior problem symptoms by eliminating measurement confounding: Expert ratings and factor analyses. *Child Development*, 73(3), 867-882.
- Lengua, L. J., & Long, A. C. (2002). The role of emotionality and self-regulation in the appraisal-coping process: Tests of direct and moderating effects. *Journal of Applied Developmental Psychology*, 23(4), 471-493.
- Lengua, L. J., West, S. G., & Sandler, I. N. (1998). Temperament as a predictor of symptomatology in children: Addressing contamination of measures. *Child Development*, 69(1), 164-181.
- Liebman, J. I. (2005). *The developmental patterns and cognitive predictors of prosocial display rule behavior and understanding: Theory of mind and inhibitory control* (Unpublished doctoral \
- Lohr, L., Teglasi, H., & French, M. (2004). Schemas and temperament as risk factors for Emotional Disability, *Personality and Individual Differences*, 36, 1637-1654.
- Longobardi, E., Spataro, P., D'Alessandro, M., & Cerutti, R. (2016). Temperament dimensions in preschool children: Links with cognitive and affective theory of mind, early education and development, *Early Education and Development*, 1-19.
- Lonigan, C. J., & Vasey, M. W. (2009). Negative affectivity, effortful control, and attention to threat-relevant stimuli. *Journal of abnormal child psychology*, 37(3), 387-399.

- Lonigan, C. J., Vasey, M. W., Phillips, B. M., & Hazen, R. A. (2004). Temperament, anxiety, and the processing of threat-relevant stimuli. *Journal of Clinical Child and Adolescent Psychology*, 33(1), 8-20.
- Lonigro, A., Laghi, F., Baiocco, R., & Baumgartner, E. (2014). Mind reading skills and empathy: Evidence for nice and nasty ToM behaviours in school-aged children. *Journal of Child and Family Studies*, 23, 581–590.
<http://dx.doi.org/10.1007/s10826-013-9722-5>
- Lucas, M. M., Wagner, L., & Chow, C. (2008). Fair game: The intuitive economics of resource exchange in four-year-olds. *Journal of Social, Evolutionary, & Cultural Psychology*, 2, 74–88. <http://dx.doi.org/10.1037/h0099353>
- Lupinetti, L. (1999). *Perspective-taking, social competence, gender, and prosocial behavior of suburban preschool children* (Unpublished doctoral dissertation). Fordham University, New York, NY.
- Martin, S. (2010). *Theory of mind, social information processing, and children's social behavior* (Unpublished doctoral dissertation). Bowling Green State University, Bowling Green, OH.
- Masten, A. S., Coatsworth, J. D., Neemann, J., Gest, S. D., Tellegen, A., & Garmezy, N. (1995). The structure and coherence of competence from childhood through adolescence. *Child development*, 66(6), 1635-1659.
- Mathieson, K., & Banerjee, R. (2010). Pre-school peer play: The beginnings of social competence. *Educational and Child Psychology*, 27(1), 9.
- Mazza, M., Mariano, M., Peretti, S., Masedu, F., Pino, M. C., & Valenti, M. (2017). The role of theory of mind on social information processing in children with autism

- spectrum disorders: A mediation analysis. *Journal of Autism and Developmental Disorders*, 47(5), 1369-1379.
- McConaughy, S. H., & Ritter, D. R. (2002). Best Practices in Multidimensional Assessment of Emotional or Behavioral Disorders.
- McGrew, M. W., & Teglasi, H. (1990). Formal characteristics of thematic apperception test stories as indices of emotional disturbance in children. *Journal of personality assessment*, 54(3-4), 639-655.
- Merrill, K. L., Smith, S. W., Cumming, M. M., & Daunic, A. P. (2017). A review of social problem-solving interventions: Past findings, current status, and future directions. *Review of Educational Research*, 87(1), 71-102.
- Mink, D., Henning, A., & Aschersleben, G. (2014). Infant shy temperament predicts preschoolers theory of mind. *Infant Behavior and Development*, 37, 66–75.
- Moore, C., Barresi, J., & Thompson, C. (1998). The cognitive basis of future-oriented prosocial behavior. *Social Development*, 7, 198–218.
- <http://dx.doi.org/10.1111/1467-9507.00062>
- Moore, C., Bosacki, S. L., & Macgillivray, S. (2011). Theory of mind and social interest in zero-acquaintance play situations. *Child Development*, 82, 1163–1172.
- Moran, L. R., Lengua, L. J., & Zalewski, M. (2013). The interaction between negative emotionality and effortful control in early social-emotional development. *Social Development*, 22(2), 340-362.
- Morgan, C., & Murray, H. A. (1935). A method for investigating fantasies: The Thematic Apperception Test. *Archives of Neurology and Psychiatry*, 34, 289–306.

- Morrow, M. T., Hubbard, J. A., McAuliffe, M. D., Rubin, R. M., & Dearing, K. F. (2006). Childhood aggression, depressive symptoms, and peer rejection: The mediational model revisited. *International Journal of Behavioral Development, 30*(3), 240-248.
- Mota, C. P., & Matos, P. M. (2013). Peer attachment, coping, and self-esteem in institutionalized adolescents: The mediating role of social skills. *European journal of psychology of education, 28*(1), 87-100.
- Mundy, P., & Newell, L. (2007). Attention, joint attention, and social cognition. *Current directions in psychological science, 16*(5), 269-274.
- Muris, P., de Jong, P. J., & Engelen, S. (2004). Relationships between neuroticism, attentional control, and anxiety disorders symptoms in non-clinical children. *Personality and Individual Differences, 37*(4), 789-797.
- Muris, P., Merckelbach, H., Wessel, I., & van de Ven, M. (1999). Psychopathological correlates of self-reported behavioural inhibition in normal children. *Behaviour Research and Therapy, 37*, 575–584.
- Newton, E., & Jenvey, V. (2011). Play and theory of mind: Association with social competence in young children. *Early Child Development and Care, 181*, 761–773. <http://dx.doi.org/10.1080/03004430.2010.486898>
- Northerner, L. M., Trentacosta, C. J., & McLearn, C. M. (2016). Negative affectivity moderates associations between cumulative risk and at-risk toddlers' behavior problems. *Journal of child and family studies, 25*(2), 691-699.

- Nozadi, S. S., Spinrad, T. L., Johnson, S. P., & Eisenberg, N. (2018). Relations of emotion-related temperamental characteristics to attentional biases and social functioning. *Emotion, 18*(4), 481.
- Oldehinkel, A. J., Hartman, C. A., De Winter, A. F., Veenstra, R., & Ormel, J. (2004). Temperament profiles associated with internalizing and externalizing problems in preadolescence. *Development and psychopathology, 16*(2), 421-440.
- Olson, S. L., Choe, D. E., & Sameroff, A. J. (2017). Trajectories of child externalizing problems between ages 3 and 10 years: Contributions of children's early effortful control, theory of mind, and parenting experiences. *Development and Psychopathology, 29*(4), 1333-1351.
- Olson, S. L., Sameroff, A. J., Kerr, D. C., Lopez, N. L., & Wellman, H. M. (2005). Developmental foundations of externalizing problems in young children: The role of effortful control. *Development and psychopathology, 17*(1), 25-45.
- Ornaghi, V., Brockmeier, J., & Grazzani, I. (2014). Enhancing social cognition by training children in emotion understanding: A primary school study. *Journal of Experimental Child Psychology, 119*, 26-39.
- Orta, I. M., Corapci, F., Yagmurlu, B., & Aksan, N. (2013). The mediational role of effortful control and emotional dysregulation in the link between maternal responsiveness and Turkish preschoolers' social competency and externalizing symptoms. *Infant and Child Development, 22*(5), 459-479.
- Ouaou, R. H. (1999). *Development of perspective taking: Applications to prosocial behavior* (Unpublished doctoral dissertation). Faculty of Pacific Graduate School of Psychology, Palo Alto, CA.

- Pecora, G., Addessi, E., Paoletti, M., & Bellagamba, F. (2018). Relations between Temperament and False Belief Understanding in the Preschool Age. *Journal of Child and Family Studies*, 27(5), 1682-1691.
- Pekrun, R., Goetz, T., Titz, W., & Perry, R. P. (2002). Academic emotions in students' self-regulated learning and achievement: A program of qualitative and quantitative research. *Educational psychologist*, 37(2), 91-105.
- Piaget, J. (1926). Psychology. *The Monist*, 430-455.
- Pinto, G., Tarchi, C., & Accorti Gamannossi, B. (2018). Kindergarteners' Narrative Competence Across Tasks and Time. *The Journal of genetic psychology*, 179(3), 143-155.
- Pinto, G., Tarchi, C., & Bigozzi, L. (2015). The relationship between oral and written narratives: A three-year longitudinal study of narrative cohesion, coherence, and structure. *British Journal of Educational Psychology*, 85(4), 551-569.
- Pons, F., & Harris, P. L. (2000). Test of Emotion Comprehension-TEC. Oxford, England: Oxford University Press.
- Pons, F., & Harris, P. L. (2002). Theory of Mind Test (TMT). Cambridge, England: Harvard University Press.
- Pope, A. W., & Bierman, K. L. (1999). Predicting adolescent peer problems and antisocial activities: The relative roles of aggression and dysregulation. *Developmental psychology*, 35(2), 335.
- Powell, J. L., Grossi, D., Corcoran, R., Gobet, F., & Garcia-Finana, M. (2017). The neural correlates of theory of mind and their role during empathy and the game of

- chess: A functional magnetic resonance imaging study. *Neuroscience*, 355, 149-160.
- Powell, L. J., Hobbs, K., Bardis, A., Carey, S., & Saxe, R. (2018). Replications of implicit theory of mind tasks with varying representational demands. *Cognitive Development*, 46, 40-50.
- Preacher, K. J., & Hayes, A. F. (2008). Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behavior Research Methods*, 40(3), 879–891. <https://doi.org/10.3758/BRM.40.3.879>
- Preacher, K. J., Rucker, D. D., & Hayes, A. F. (2007). Addressing moderated mediation hypotheses: Theory, methods, and prescriptions. *Multivariate behavioral research*, 42(1), 185-227.
- Putnam, S. P., & Rothbart, M. K. (2006). Development of short and very short forms of the Children's Behavior Questionnaire. *Journal of personality assessment*, 87(1), 102-112.
- Putnam, S. P., & Stifter, C. A. (2005). Behavioral approach–inhibition in toddlers: Prediction from infancy, positive and negative affective components, and relations with behavior problems. *Child Development*, 76(1), 212-226.
- Randall, B. A. (2002). *The relation of cognitive, emotional, and motivation variables to preschoolers' sharing* (Unpublished doctoral dissertation). University of Nebraska, Lincoln, NE.
- Raver, C. C., & Knitzer, J. (2002). Ready to enter: What research tells policymakers about strategies to promote social and emotional school readiness among three- and four-year-old children.

- Raver, C. C., Blackburn, E. K., Bancroft, M., & Torp, N. (1999). Relations between effective emotional self-regulation, attentional control, and low-income preschoolers' social competence with peers. *Early education and Development, 10*(3), 333-350.
- Renk, K., & Phares, V. (2004). Cross-informant ratings of social competence in children and adolescents. *Clinical psychology review, 24*(2), 239-254.
- Renouf, A., Brendgen, M., Séguin, J. R., Vitaro, F., Boivin, M., Dionne, G., ... & Périusse, D. (2010). Interactive links between theory of mind, peer victimization, and reactive and proactive aggression. *Journal of abnormal child psychology, 38*(8), 1109-1123.
- Ridgeway, D., Waters, E., & Kuczaj, S. A. (1985). Acquisition of emotion-descriptive language: Receptive and productive vocabulary norms for ages 18 months to 6 years. *Developmental Psychology, 21*(5), 901.
- Rieffe, C., Meerum Terwogt, M., Koops, W., & Hageraar, J. (2000). The desirability of beliefs: Preschoolers' appreciation of fact beliefs and subsequent emotions. *Infant and Child Development: An International Journal of Research and Practice, 9*(3), 147-160.
- Rieffe, C., Terwogt, M. M., Koops, W., Stegge, H., & Oomen, A. (2001). Preschoolers' appreciation of uncommon desires and subsequent emotions. *British Journal of Developmental Psychology, 19*(2), 259-274.
- Rimm-Kaufman, S. E., & Pianta, R. C. (2000). An ecological perspective on the transition to kindergarten: A theoretical framework to guide empirical research. *Journal of Applied developmental psychology, 21*(5), 491-511.

- Rispoli, K. M., McGoe, K. E., Koziol, N. A., & Schreiber, J. B. (2013). The relation of parenting, child temperament, and attachment security in early childhood to social competence at school entry. *Journal of school psychology, 51*(5), 643-658.
- Rose-Krasnor, L. (1997). The nature of social competence: A theoretical review. *Social development, 6*(1), 111-135.
- Rothbart MK, Bates JE. 2006. Temperament. In *Handbook of Child Psychology. Vol. 3: Social Emotional and Personality Development*, ed. W Damon, N Eisenberg, pp. 105–76. New York: Wiley
- Rothbart, M. K. (1986). Longitudinal observation of infant temperament. *Developmental Psychology, 22*(3), 356.
- Rothbart, M. K. (2011). *Becoming who we are: Temperament and personality in development*. Guilford Press.
- Rothbart, M. K., & Putnam, S. P. (2002). Temperament and socialization.
- Rothbart, M. K., Ahadi, S. A., & Evans, D. E. (2000). Temperament and personality: origins and outcomes. *Journal of personality and social psychology, 78*(1), 122.
- Rothbart, M. K., Ahadi, S. A., & Hershey, K. L. (1994). Temperament and social behavior in childhood. *Merrill-Palmer Quarterly (1982-), 21*-39.
- Rothbart, M. K., Ahadi, S. A., Hershey, K. L., & Fisher, P. (2001). Investigations of temperament at three to seven years: The Children's Behavior Questionnaire. *Child development, 72*(5), 1394-1408.
- Rothbart, M. K., Derryberry, D., & Hershey, K. (2000). Stability of temperament in childhood: Laboratory infant assessment to parent report at seven years. *Temperament and personality development across the life span, 85*-119.

- Rothbart, M. K., Sheese, B. E., & Posner, M. I. (2007). Executive attention and effortful control: Linking temperament, brain networks, and genes. *Child development perspectives, 1*(1), 2-7.
- Rothbart, M.K., Ahadi, S.A., Hershey, K.L., & Fisher, P. (2001). Investigations of temperament
- Rothenberg, B. B. (1970). Children's social sensitivity and the relationship to interpersonal competence, intrapersonal comfort, and intellectual level. *Developmental Psychology, 2*(3), 335–350. <https://doi.org/10.1037/h0029175>
- Rubin, K. H., & Rose-Krasnor, L. (1992). Interpersonal problem solving and social competence in children. In *Handbook of social development* (pp. 283-323). Springer, Boston, MA.
- Rubin, K. H., Coplan, R. J., Fox, N. A., & Calkins, S. D. (1995). Emotionality, emotion regulation, and preschoolers' social adaptation. *Development and psychopathology, 7*(1), 49-62.
- Rubin, K., Bukowski, W., & Parker, J. (2006). Peers, relationships, and interactions. *Handbook of child psychology, 3*, 571-645.
- Rudasill, K. M., & Konold, T. R. (2008). Contributions of children's temperament to teachers' judgments of social competence from kindergarten through second grade. *Early Education and Development, 19*(4), 643-666.
- Ruffman, T., Slade, L., Devitt, K., & Crowe, E. (2006). What mothers say and what they do: The relation between parenting, theory of mind, language and conflict/cooperation. *British Journal of Developmental Psychology, 24*, 105–124.

Rushton, J. P., & Wiener, J. (1975). Altruism and cognitive development in children.

British Journal of Social and Clinical Psychology, 14, 341–349.

<http://dx.doi.org/10.1111/j.2044-8260.1975.tb00190.x>

Russell, J. (1996). *Agency: Its role in mental development*. Hove, England: Erlbaum.

Russo-Ponsaran, N. M., McKown, C., Johnson, J. K., Allen, A. W., Evans-Smith, B., &

Fogg, L. (2015). Social-emotional correlates of early stage social information processing skills in children with and without autism spectrum disorder. *Autism Research*, 8(5), 486-496.

Rydell, A. M., Bohlin, G., & Thorell, L. B. (2005). Representations of attachment to parents and shyness as predictors of children's relationships with teachers and peer competence in preschool. *Attachment & human development*, 7(2), 187-204.

Rydell, A. M., Thorell, L. B., & Bohlin, G. (2007). Emotion regulation in relation to social functioning: An investigation of child self-reports. *European Journal of Developmental Psychology*, 4(3), 293-313.

Saarni, C. (1984). An observational study of children's attempts to monitor their expressive behavior. *Child development*, 1504-1513.

Sackett, P.R. (2007). Revisiting the origins of the typical-maximum performance distinction (2007). *Human Performance*, 20 (3): 179-185.

Sallquist, J. V., Eisenberg, N., Spinrad, T. L., Reiser, M., Hofer, C., Zhou, Q., ... & Eggum, N. (2009). Positive and negative emotionality: Trajectories across six years and relations with social competence. *Emotion*, 9(1), 15.

- Saltzman-Benaiah, J., & Lalonde, C. E. (2007). Developing clinically suitable measures of social cognition for children: Initial findings from a normative sample. *The Clinical Neuropsychologist*, 21(2), 294-317.
- Schwartz, C. E., Snidman, N., & Kagan, J. (1999). Adolescent social anxiety as an outcome of inhibited temperament in childhood. *Journal of the American Academy of Child & Adolescent Psychiatry*, 38(8), 1008-1015.
- Scott, & Baillargeon, 2017Sanson, A., Hemphill, S. A., & Smart, D. (2004). Connections between temperament and social development: A review. *Social Development*, 13(1), 142-170.
- Sebastian, C. L., McCrory, E. J., Cecil, C. A., Lockwood, P. L., De Brito, S. A., Fontaine, N. M., & Viding, E. (2012). Neural responses to affective and cognitive theory of mind in children with conduct problems and varying levels of callous-unemotional traits. *Archives of general psychiatry*, 69(8), 814-822.
- Selman, R. L. (1980). *The growth of interpersonal understanding: Developmental and clinical analyses*. Academy Press.
- Selman, R., & Byrne, D. (1974). A Structural-Developmental Analysis of Levels of Role Taking in Middle Childhood. *Child Development*, 45(3), 803-806.
doi:10.2307/1127850
- Shipley, T. F., & Zacks, J. M. (Eds.). (2008). *Understanding events: From perception to action* (Vol. 4). Oxford University Press.
- Shonkoff, J. P., Phillips, D. A., & National Research Council. (2000). Acquiring self-regulation. In *From neurons to neighborhoods: The science of early childhood development*. National Academies Press (US).

- Shrout, P. E., & Fleiss, J. L. (1979). Intraclass correlations: uses in assessing rater reliability. *Psychological bulletin*, 86(2), 420.
- Simon, L. (2001). *Psychosocial correlates of relational and overt aggression in preschool children* (Unpublished doctoral dissertation). Fordham University, New York, NY.
- Slaughter, V., Dennis, M. J., & Pritchard, M. (2002). Theory of mind and peer acceptance in preschool children. *British Journal of Developmental Psychology*, 20, 545–564. <http://dx.doi.org/10.1348/026151002760390945>
- Slaughter, V., Imuta, K., Peterson, C. C., & Henry, J. D. (2015). Meta-analysis of theory of mind and peer popularity in the preschool and early school years. *Child development*, 86(4), 1159-1174.
- Slomkowski, C. L., & Killen, M. (1992). Young children's conceptions of transgressions with friends and nonfriends. *International Journal of Behavioral Development*, 15(2), 247-258.
- Song, J., Volling, B. L., Lane, J. D., & Wellman, H. M. (2016). Aggression, sibling antagonism, and theory-of-mind during the first year of siblinghood: A developmental cascade model. *Child Development*, 87, 1250–1263.
- Spatz-McNeary, J. L. (2005). *Psychological understanding and social behaviour in young children* (Unpublished doctoral dissertation). Bryn Mawr College, Bryn Mawr, PA.
- Spector, P. E. (2019). Do not cross me: Optimizing the use of cross-sectional designs. *Journal of Business and Psychology*, 34(2), 125-137.

- Spinrad, T. L., Eisenberg, N., Cumberland, A., Fabes, R. A., Valiente, C., Shepard, S. A., ... & Guthrie, I. K. (2006). Relation of emotion-related regulation to children's social competence: a longitudinal study. *Emotion*, 6(3), 498.
- Spinrad, T. L., Eisenberg, N., Harris, E., Hanish, L., Fabes, R. A., Kupanoff, K., ... & Holmes, J. (2004). The relation of children's everyday nonsocial peer play behavior to their emotionality, regulation, and social functioning. *Developmental psychology*, 40(1), 67.
- Sroufe, L. A. (1979). The coherence of individual development: Early care, attachment, and subsequent developmental issues. *American psychologist*, 34(10), 834.
- Sroufe, L. A., Schork, E., Motti, F., Lawroski, N., & LaFreniere, P. (1985). The role of affect in social competence.
- Stanzione, C., & Schick, B. (2014). Environmental language factors in theory of mind development: Evidence from children who are deaf/hard-of-hearing or who have specific language impairment. *Topics in Language Disorders*, 34(4), 296-312.
- Stewart, J. L., Sifton, R. L., Sass, S. M., Fisher, J. E., Edgar, J. C., Heller, W., & Miller, G. A. (2010). Attentional bias to negative emotion as a function of approach and withdrawal anger styles: an ERP investigation. *International Journal of Psychophysiology*, 76(1), 9-18.
- Stifter, C. A., Cipriano, E., Conway, A., & Kelleher, R. (2009). Temperament and the development of conscience: The moderating role of effortful control. *Social Development*, 18(2), 353-374.

- Strauss, M. E., & Rourke, D. L. (1978). A multivariate analysis of the neonatal behavioral assessment scale in several samples. *Monographs of the Society for Research in Child Development*, 81-91.
- Strayer, J. & Roberts, W. (1989). Children's empathy and role taking: Child and parental factors, and relations to prosocial behaviour. *Journal of Applied Developmental Psychology*, 10, 227–239. [http://dx.doi.org/10.1016/0193-3973\(89\)90006-3](http://dx.doi.org/10.1016/0193-3973(89)90006-3)
- Strelau, J. (2008). *Temperament as a regulator of behavior: After fifty years of research*. Eliot Werner Publications.
- Takahashi, F., Koseki, S., & Shimada, H. (2009). Developmental trends in children's aggression and social problem-solving. *Journal of Applied Developmental Psychology*, 30(3), 265-272.
- Tamir, M., & Robinson, M. D. (2007). The happy spotlight: Positive mood and selective attention to rewarding information. *Personality and Social Psychology Bulletin*, 33(8), 1124-1136.
- Taylor, Z. E., Eisenberg, N., VanSchyndel, S. K., Eggum-Wilkens, N. D., & Spinrad, T. L. (2014). Children's negative emotions and ego-resiliency: Longitudinal relations with social competence. *Emotion*, 14(2), 397.
- Teglasi, H. (2010). *Essentials of TAT and other storytelling assessments* (Vol. 64). John Wiley & Sons.
- Teglasi, H., & Epstein, S. (1998). Temperament and personality theory: The perspective of cognitive-experiential self-theory. *School Psychology Review*, 27(4), 534.

- Teglasi, H., Schussler, L., Gifford, K., Annotti, L. A., Sanders, C., & Liu, H. (2015). Child behavior questionnaire–short form for teachers: Informant correspondences and divergences. *Assessment*, 22(6), 730-748.
- Thomas, A., Chess, S., Birch, H. G., Hertzog, M. E., & Korn, S. (1963). Behavioral individuality in early childhood.
- Thompson, R. A., & Newton, E. K. (2013). Baby altruists? Examining the complexity of prosocial motivation in young children. *Infancy*, 18(1), 120-133.
- Vaish, A., Grossmann, T., & Woodward, A. (2008). Not all emotions are created equal: the negativity bias in social-emotional development. *Psychological bulletin*, 134(3), 383.
- Van Tassel, E. B. (1979). *The relationship between perspective-taking abilities and prosocial behaviors in preschool and kindergarten children* (Unpublished doctoral dissertation). Purdue University, West Lafayette, IN.
- Veiga, G., Neto, C., & Rieffe, C. (2016). Preschoolers' free play: connections with emotional and social functioning.
- Verron, H., & Teglasi, H. (2018). Indirect effects of temperament on social competence via emotion understanding. *Early Education and Development*, 29(5), 655-674.
- Vinden, P. G. (1999). Children's understanding of mind and emotion: A multi-culture study. *Cognition & Emotion*, 13(1), 19-48.
- Walker, S. (2005). Gender differences in the relationship between young children's peer-related social competence and individual differences in theory of mind. *The Journal of Genetic Psychology*, 166, 297–312.

- Walker, S. (2005). Gender differences in the relationship between young children's peer-related social competence and individual differences in theory of mind. *The Journal of Genetic Psychology*, 166, 297–312.
<http://dx.doi.org/10.3200/GNTP.166.3.297-312>
- Walker, S., Berthelsen, D. C., & Irving, K. A. (2001). Temperament and peer acceptance in early childhood: Sex and social status differences. *Child Study Journal*, 31(3), 177-192.
- Waters, E., & Sroufe, L. A. (1983). Social competence as a developmental construct. *Developmental review*, 3(1), 79-97.
- Watson, A. C., Nixon, C. L., Wilson, A., & Capage, L. (1999). Social interaction skills and theory of mind in young children. *Developmental psychology*, 35(2), 386.
- Weimer, A. A., & Gasquoine, P. G. (2016). Belief reasoning and emotion understanding in balanced bilingual and language-dominant Mexican American young children. *The Journal of genetic psychology*, 177(2), 33-43.
- Weimer, A., & Guajardo, N. (2005). False Belief, Emotion Understanding, and Social Skills Among Head Start and Non-Head Start Children. *Early Education and Development*, 16(3, July 2005), 37–41.
- Wellman, H. M., & Liu, D. (2004). Scaling of theory-of-mind tasks. *Child Development*, 75(2), 523–541.
- Wellman, H. M., Lane, J. D., LaBounty, J., & Olson, S. L. (2011). Observant, nonaggressive temperament predicts theory of mind development. *Developmental Science*, 14, 319–326.

- Wellman, H., Cross, D., & Watson, J. (2001). Meta-analysis of theory of mind development: The truth about false belief. *Child Development*, 72, 655-684.
- Westby, C., & Robinson, L. (2014). A developmental perspective for promoting theory of mind. *Topics in Language Disorders*, 34(4), 362-382.
- Westen, D. (1988). Transference and information processing. *Clinical Psychology Review*, 8(2), 161-179.
- Widen, S. C., & Russell, J. A. (2008). Children acquire emotion categories gradually. *Cognitive development*, 23(2), 291-312.
- Wimmer, H., & Perner, J. (1983). Beliefs about beliefs: Representation and constraining function of wrong beliefs in young children's understanding of deception. *Cognition*, 13(1), 103-128
- Wu, Z., & Su, Y. (2014). How do preschoolers' sharing behaviors relate to their theory of mind understanding? *Journal of Experimental Child Psychology*, 120, 73–86.
<http://dx.doi.org/10.1016/j.jecp.2013.11.007>
- Yagmurlu, B. (2014). Relations among sociocognitive abilities and prosocial behavior. *Journal of Child and Family Studies*, 23, 591–603.
<http://dx.doi.org/10.1007/s10826-013-9726-1>
- Yagmurlu, B., Sanson, A., & Koymen, S. B. (2005). Effects of parenting and child temperament on the development of prosocial behavior: The mediating role of theory of mind. *Turkish Journal of Psychology*, 20, 1–20.
- Zahn-Waxler, C., Iannotti, R., & Chapman, M. (1982). Peers and prosocial development. In *Peer relationships and social skills in childhood* (pp. 133-162). Springer, New York, NY.

Zahn-Waxler, C., Yarrow, M. R., & Brady-Smith, J. (1977). Perspective taking and prosocial behavior. *Developmental Psychology*, 12, 87–88.

<http://dx.doi.org/10.1037/0012-1649.13.1.87>

Zhou, Q., Main, A., & Wang, Y. (2010). The relations of temperamental effortful control and anger/frustration to Chinese children's academic achievement and social adjustment: A longitudinal study. *Journal of Educational Psychology*, 102(1), 180.