

**Relationships Between Mother-Child Conversations about emotions and Socio-emotional  
Development of Children with Autism Spectrum Disorder**

Marie-Joëlle Beaudoin,  
Université du Québec à Montréal,  
C.P. 8888, succursale Centre-ville, Montréal (Québec), H3C 3P8  
beaudoin.marie-joelle@courrier.uqam.ca,

Nathalie Poirier  
Université du Québec à Montréal,  
C.P. 8888, succursale Centre-ville, Montréal (Québec), H3C 3P8  
poirier.nathalie@uqam.ca

Nathalie Nader-Grosbois  
Université Catholique de Louvain,  
Place de l'Université 1, 1348 Ottignies-Louvain-la-Neuve, Belgique  
nathalie.nader@uclouvain.be

**Abstract**

Mother-child emotion-related conversations, as a practice of parental socialization of emotion, can help children with autism spectrum disorder (ASD) develop socio-emotional skills. This study intends to explore relationships between mother-child conversations about emotions and socio-emotional skills of children with ASD by accounting for the moderating role of children personality traits and mothers' emotional openness. Mothers of children with ASD ( $n = 49$ ) responded to five questionnaires describing their conversations about emotions, emotional openness as well as their child's socio-emotional skills and personality. We conducted hierarchical regression and moderation analyses. Our findings indicate that frequent mother-child conversations about emotions significantly predict higher emotional regulation and Theory of Mind (ToM) abilities in children with ASD ( $p < .05$ ). Moreover, children's consciousness and openness to experience, along with mothers' emotional openness significantly moderate the relation between mother-child conversations about emotions and children's ToM skills ( $p < .05$ ).

Mother-child conversations about emotions, as a practice of parental socialization of emotion, could be beneficial for children with ASD. Children's personality traits and mothers' openness to emotion may act as a protective factor of ToM skills in children with ASD.

Relationships Between Mother-Child Conversations about emotions and Socio-emotional  
Development of Children with Autism Spectrum Disorder

**Introduction**

In developmental psychology/psychopathology, researchers and professionals emphasize the importance of socio-emotional development and efficient support to prevent deficits in children or to boost their abilities in this domain. Possible protective versus risk factors play a role in the development of socio-emotional abilities in children. These factors can be individual, familial, or environmental. Individual factors include children's age and personality as well as parents' beliefs on emotions. Environmental and familial factors include parental education practices and parents' socialization of emotion (Jacobs et al., 2019; Jones et al., 2002; Kochanska et al., 2007; Lozada et al., 2015; Mazzone & Nader-Grosbois, 2017a). The heuristic model of Emotion-Related Socialization Behaviors in parents (ERSBs), developed by Eisenberg et al. (1998), distinguishes parents' reactions to children's emotions, parent-child emotion-related conversations, and parents' emotional expressiveness. Authors explain that these parental ERSBs impact children's socio-emotional skills (and vice versa) and consider several moderators that could influence these relationships (e.g., children's personality, age, and developmental level; parents' emotion-related beliefs, age, and gender). Eisenberg's heuristic model of socialization offers strong theoretical support for studies that aim to explore the relations of parental socialization of emotion and children's socio-emotional development (Eisenberg, 2020). Several studies based on Eisenberg and his colleague's model of socialization process, investigated links between several parental ERSBs and social competencies and behaviors of typically developing (TD) children (Eisenberg, 2020; Eisenberg et al., 1998; Jones et al., 2002; Mazzone & Nader-Grosbois, 2017a). Atypical developing children's studies, examining associations between

parental ERSBs and children's social competencies and behaviors, focus mostly on parental reactions (Alostaz et al., 2021; Jacobs et al., 2019; Jordan et al., 2021; Mazzone and Nader-Grosbois, 2017b; Moffit et al., 2021). Few studies explore the relation between parent-child emotion-related conversations—a parental ERSBs—and social competencies and behaviors in children with ASD. Nonetheless, studies report that parent-child discussions can enhance social competencies and behaviors of TD children. Therefore, our study aims to contribute on filling the existing gaps in the current literature by focusing on parent-child conversations about emotions in children with ASD.

In TD children, previous studies mainly observed that parents' behaviors during emotion-related conversations may influence children's emotional regulation and ToM abilities (Cui et al., 2020; Denham et al., 1994; Eisenberg et al., 1998; Fivush et al., 2009; Mazzone & Nader-Grosbois, 2017a; Morelen & Suveg, 2012). Therefore, parents who regularly engage in conversations—explaining the causes and consequences of emotions, encouraging emotional expression, and positively labelling emotions—facilitate children learning of emotional expression, understanding, and regulation (Eisenberg et al., 1998; Fivush et al., 2009; Morelen & Suveg, 2012). For example, during a conversation, a parent could explain to their child why a person is sad (cause of emotion), how the person reacts—in search of comfort (consequence of emotion)—and that it is normal to be sad sometimes (positive labelling). Moreover, during these discussions, parents could make a connection between the emotional situation lived by the person and children's emotional experiences. These conversations offer parental coaching and support children's expression of emotions, questioning about emotions, and parental explanations (e.g., explaining a character's emotion while reading a story to the child; Eisenberg et al., 1998). Through parent-child discussions about emotions, parents become facilitators of

emotional socialization. In distinguishing mothers and fathers' ERSBs, studies show that maternal practice of emotion-related conversations is associated with the development of emotional regulation and ToM abilities in TD children (Cui et al., 2020; Garner, 2006; Mazzone & Nader-Grosbois, 2017a). In mothers of TD children, mother-child discussions about emotions are positively tied to children's use of prosocial emotional regulation behaviors (e.g., asking for social support; Garner, 2006). In the long term, frequent parent-child conversations in which parents show support regarding their child's emotions improve the child's emotional regulation (Cui et al., 2020). Furthermore, parent-child supporting discussions can positively impact the child's mentalization of its own emotional states and those of others, as parents encourage their children to express their emotional experiences (Eisenberg et al., 1998).

The effect of emotion-related conversations on children's acquisition of socio-emotional skills is moderated by children and parents' characteristics in typical and atypical populations (Brumariu & Kerns, 2015; Jacobs et al., 2019; Jones et al., 2002; Laible & Song, 2016; Lozada et al., 2015; Tingley et al., 1994). Indeed, children's level of willingness to take part in discussions about emotions, parents' beliefs about emotions, and children's age are among moderating factors (Brumariu & Kerns, 2015; Laible & Song, 2016; Lozada et al., 2015). In TD children, the use of parental instructional strategies during parent-child conversations about emotions (e.g., parents teaching, labelling, or encouraging emotions) and the frequency of their utilization is moderated by parents' emotional beliefs (Lozada et al., 2015). Parents who strongly believe that expressing emotions is good will frequently encourage their child to express negative emotions, whereas parents who strongly believe that expressing emotions is dangerous will be less inclined to do so. (Lozada et al., 2015.) The study led by Mazzone and Nader-Grosbois (2017a) indicates that mothers who present emotional regulation skills have less

frequent conversations about emotions with their child. Mazzone and Nader-Grosbois (2017a) also report that mother-child conversations about emotions have a positive effect on ToM abilities in TD preschoolers. As for children's characteristics, a study conducted among TD children suggests that parenting interactions with emotion-related conversations have a successful impact on the acquisition of pro-social behaviors in children that are fearless (Kochanska et al., 2007). Moreover, when mothers are displaying emotion-focus responses to negative emotions in a conversation, children with lower socio-emotional intensity demonstrate higher levels of socio-emotional skills (Jones et al., 2002). Therefore, children's personality seems to moderate the effect of mother-child conversations about emotions on acquisition of socio-emotional skills. Some studies examined moderators of parental conversations on emotions in children with intellectual disability disorder (IDD). Tingley and colleagues (1994) reported that mothers of children with Down Syndrome had fewer emotion-related conversations compared to mothers of TD children. Jacobs and colleagues (2019) emphasized the influence of parental ERSB on emotional regulation and ToM abilities in children with IDD. In their study, Jacobs and colleagues (2019) targeted moderators such as age, children developmental age, as well as parents' gender, socio-economic and education levels. Children and mothers' characteristics seem to moderate the maternal emotional socialization behaviors that directly predict children's socio-emotional skills in children with IDD. Thus, it seems important to investigate the impact of parent-child conversations about emotions in children who present disabilities, and particularly in children with ASD. Our study aims to clarify the relationship between parent-child conversations about emotions and emotional regulation as well as ToM skills in children with ASD while considering individual factors as possible protective factors.

Why could ASD induce specificities in parent-child conversations about emotions? Let us recall some specificities of their profiles. ASD is a neurodevelopmental disorder, characterized by deficits in social communication as well as restricted and repetitive behaviors and interests (American Psychology Association [APA], 2015). Social communication deficits can be observed through a child struggling to develop, understand and maintain social relationships (e.g., struggling to develop friendships), shortcomings in emotional and social reciprocity (e.g., difficulty to engage in bidirectional conversations), and through difficulty using non-verbal behaviors (e.g., using facial expressions during social interactions (APA, 2015)). Restricted and repetitive patterns of behaviors and interests can be observed through intolerance to changes or an exaggerated adherence to routines, an intense and overly focused interest in an object or activity, repetitive and stereotyped movements, and hyper- or hyposensitivity (APA, 2015). In early childhood, symptoms of ASD can delay the development of socio-emotional skills (Chevallier et al., 2012; Jones et al., 2018; Samson et al., 2015). Children with ASD may present problematic emotional responses, such as excessive anger, which is caused by emotional dysregulation (Cai et al., 2018; Samson et al., 2015). Emotional regulation enables a child to adopt appropriate responses during social interactions and facilitate their ability to cope with novel situations (Samson et al., 2015). In the case of children with ASD, the use of emotional regulation strategies (e.g., asking for social support, problem-solving, or cognitive reappraisal) may not be effective. Likewise, children with ASD may opt for maladaptive strategies (e.g., avoidance, crying, suppression, or defense) (Jahromi et al., 2012; Konstantareas & Stewart, 2006; Samson et al., 2015). In addition to being linked to difficulties with emotional regulation, ASD may also be associated with ToM deficits (Jones et al., 2018; Mazzone & Nader-Grosbois, 2017b). Children with ASD may have difficulties mentalizing their own emotional states and

those of others. The atypical social behaviors of children with ASD may contribute to ToM deficits (Jones et al., 2018). Attributing mental states requires a person to pay attention to social details (e.g., facial expressions), which can be challenging for children with ASD due to their deficits in social communication (Chevallier et al., 2012). The severity of associated deficits among children with ASD is heterogeneous (Masi et al., 2017). Therefore, the level of ToM deficits and emotional regulation deficits differ among children with ASD depending on their characteristics such as personality traits. Indeed, Nader-Grosbois and Mazzone (2014) highlight the predictive value of children's personality on emotional regulation. Their findings indicate that children with ASD who tend to be compassionate and to enjoy being with people are more likely to present elevated emotional regulation skills. Moreover, children with ASD who tend to be open to experience, curious, and creative are more likely to present elevated ToM skills (Nader-Grosbois & Mazzone, 2014).

Previous studies showed that parental ERSBs are positively associated with ToM and emotional regulation abilities in children with ASD (Laurent & Gorman, 2018; Mazzone & Nader-Grosbois, 2017b; Slaughter et al., 2007). Slaughter and colleagues (2007) suggest that emotion clarifications during storytelling have positive effects on ToM skills in children with ASD, whereas cognitive clarifications have no effect on ToM development. Indeed, maternal use of sentences that explicitly clarifies characters' feelings, explains sources of knowledge, and notes discrepancies (e.g., "He's getting angry because dogs don't like cats") is associated with higher understanding of various mental states and processes—ToM abilities—in children with ASD (Slaughter et al., 2007). Parents' involvement in conversations about children's emotional states during a parent-child activity is associated with display of emotional regulation behaviors in children with ASD (Laurent & Gorman, 2018). Therefore, maternal discussions about

emotions are likely to be associated with ASD-diagnosed children's development of ToM and emotional regulation abilities (Laurent & Gorman, 2018; Slaughter et al., 2007). In their study, based on Eisenberg's heuristic model, Mazzone and Nader-Grosbois (2017b) found an association between parental reactions to emotions and ToM abilities in children with ASD. Outcomes suggest that mothers using problem-focused approaches (e.g., talking with their child when they indicate that they are scared) in response to their child's expression of negative emotions enables their child to understand the causes and consequences of emotions (Mazzone & Nader Grosbois, 2017b). In other words, a well-adjusted parental reaction to their child negative emotions has a positive influence on ToM abilities in children with ASD (Mazzone & Nader Grosbois, 2017b). Previous studies provided a better understanding of the relation between parental reactions to emotions and socio-emotional skills of children with ASD (Alostaz et al., 2021; Jordan et al., 2021; Mazzone and Nader-Grosbois, 2017b; Moffit et al., 2021). Nonetheless, few studies focus on parent-child conversations about emotions in children with ASD (Laurent & Gorman, 2018; Slaughter et al., 2007). Bougher-Muckian and colleagues (2016) suggested that future studies, regarding ESBRs role in social competencies of ASD children, should include moderators such as children's personality traits and mothers' emotional openness.

This cross-sectional study aims to explore the influence of mother-child conversations about emotions on ToM and emotional regulation abilities of children with ASD while considering characteristics from both mothers and children. More specifically, the objective is to explore the moderating role of children personality and mothers' emotional openness in the relation between emotion-related conversations, ToM skills, and emotional regulation skills in children with ASD. We expect that mother-child conversations about emotions will positively

and significantly predict emotional regulation and ToM abilities of children with ASD. We hypothesized that the association between mother-child conversations about emotions and socio-emotional skills of children with ASD will be moderated by children's personality traits and by mothers' emotional openness.

## Method

### Participants

Forty-nine mothers (age:  $M = 37.96$ ,  $SD = 5.2$ , min. = 26, max. = 51) of children with an ASD diagnosis at the time of the study (age:  $M = 8.01$ ,  $SD = 2.68$ , Min. = 3, Max. = 13; girl:  $n = 5$ ; boy:  $n = 44$ ) participated in a broader study conducted in Quebec and Belgium. The inclusion criterion was to be the mother of a child with an existing ASD diagnosis confirmed by a physician, psychologist, or neuropsychologist. For this study, only mothers living in the province of Quebec were included. Mothers had to be French-speaking and were required to have internet access. To be included in this study, their school-aged children needed to attend a special or regular class in a regular school. Mothers whose child attended a special school at the time of the study were excluded. The original sample of the broader study included children with IDD along with children with ASD without IDD. For this study, we excluded mothers of children with IDD. Among all mothers included, each has either a high school education ( $n = 4$ ), a vocational education ( $n = 3$ ), a college education ( $n = 15$ ), or a university education ( $n = 27$ ).

In Quebec, to make a diagnosis of ASD, certified professionals (e.g., physicians, psychologists, neuropsychologists, and pediatricians) follow the DSM-5 criteria (*Collège des Médecins et Ordre des Psychologues du Québec*, 2012). Standard evaluation guidelines are provided by the *Collège des Médecins* and the *Ordre des Psychologues du Québec* (OPQ) which state that the Autism Diagnostic Observation System (ADOS) and the Autism diagnostic

interview-Revised (ADI-R) should be used to assess ASD. Diagnostic confirmation was given to each mother by a physician, a psychologist or a neuropsychologist after a standard evaluation following of the *Collège des Médecins* and OPQ's guidelines. Unfortunately, we did not have access to the full evaluation record due to the confidentiality rules of OPQ. Therefore, we used the Childhood Autism Rating Scale Test (CARS) to assess children's language, intellectual functioning, and ASD levels (Schopler et al., 1980). Based on the intellectual and communication scale scores, children's language level ( $M = 2.07$ ;  $SD = 1.01$ ) and intellectual level ( $M = 1.82$ ;  $SD = 0.96$ ) are comparable to children of the same age. Based on total scoring, 18 children with ASD presented a high level of functioning, 21 children with ASD presented a moderate level of functioning, and five children had a low level of functioning ( $M = 32.02$ ;  $SD = 6.23$ ).

## **Measures**

### ***Childhood Autism Rating Scale***

The CARS is a 15-item questionnaire that helps identify autism symptoms and helps determine symptoms' severity. The CARS scores are based on parent-report. The CARS can be completed in the form of an interview. According to the CARS manual, a total score of  $\geq 30$  points is an indication of ASD-related symptoms (Schopler et al., 1980). Internal consistency is .94 and interrater reliability is .71 (Schopler et al., 1980). The CARS have strong correct classification scores, with coefficients ranging between .81 and .86 (Falkmer et al., 2013). In research, setting parent-reports such as the CARS can be a useful short instrument to evaluate language abilities of children with ASD (Miller et al., 2017).

### ***Emotional Regulation***

We measured mothers' perceptions of their child's emotional regulation abilities with the Emotion Regulation Checklist (ERC), developed by Shields and Cicchetti (1997). Although the ERC was designed for school-aged children, it has also been successfully used in studies that include preschool children (Miller et al., 2004). Mothers participating in this study answered 24 items using a four-point Likert scale ranging from "never" to "almost always" to describe their child's emotional regulation abilities. Items are divided into two subscales: (1) the Emotion Regulation subscale (ER) and (2) the Emotion Dysregulation subscale (EDR). A score between zero and 96 is obtained for each subscale. For the ER subscale, a higher score implies parents more frequently report that their child has emotional regulation abilities. For the EDR subscale, a higher score implies parents more frequently report that the child presents emotional dysregulation. The Cronbach's alpha is .72 for the Emotion Regulation subscale and .82 for the Emotion Dysregulation subscale (Nader-Grosbois & Mazzone, 2014).

### ***Theory of Mind***

To measure mothers' perceptions of their children ToM abilities, we used Hutchins and colleagues' (2012) Theory of Mind Inventory (ToMI) for children (ages 3 through 17). Mothers participating in this study were asked to use a continuum scale (ranging from 0, absolutely not, to 20, absolutely) to express the extent to which they agreed with each of 39 statements (e.g., "My child understands that a person may lie to trick others"). The ToMI evaluates various mental states (e.g., emotions, beliefs, desires, intentions, and empathy). The items can be divided into three subscales: (1) the ToMI-Affective subscale (ToMI-A), which refers to the affective state of emotions and desires; (2) the ToMI thinking subscale (ToMI-T), which refers to the cognitive state of thinking, intentions of morality and knowledge; and (3) the ToMI-Belief subscale (ToMI-B), which refers to the cognitive state of beliefs and intentions that guide behaviour. A

total average ToMI score (ToMI-t) summarizes the three subscales' scores; the higher the score, the more the parent perceives that their child has theory of mind abilities. The Cronbach's alpha for the ToMI is .94 and varies between .72 and .94 for the subscales. The test-retest reliability coefficient is .86 (Mazzone & Nader-Grosbois, 2017).

### ***Children Personality***

We measured the perception of the mothers regarding their child's personality with the Bipolar Rating Scales based on the Five Factor Model (EBMCF), developed by Roskam and colleagues (2000). Mothers answered 25 items describing five personality factors of their child: extraversion, agreeableness, conscientiousness, emotional stability, and openness to experience. A nine-point Likert scale is provided for each item. The items are presented as a pair of adjectives at each end of the scale (e.g., one point for a reserved child and nine points for a self-confident child). Parents are asked to award points to best reflect the personality of their child. An average score ranging from 1 to 9 is calculated for each factor—the higher the score, the more the parent characterizes their child as the factor described. The internal consistency of the questionnaire varies from .70 to .93 and the test-retest reliability coefficient ranges from .80 to .89 (Nader-Grosbois & Mazzone, 2014).

### ***Mothers' Emotional Openness***

We measured mothers' openness to emotions with the Dimensions of Openness to Emotions Questionnaire (DOE), developed by Reicherts (1999). The DOE consists of six subscales that produce a profile characterizing the person in terms of their emotional openness. The DOE was used to describe the emotional openness of mothers of children with ASD. The six subscales are (1) cognitive and conceptual representation (CONREP), (2) communication and expression of emotions (COMEMO), (3) perception of external emotional indicators (PEREXT),

(4) perception of internal bodily indicators and phenomena (PERINT), (5) emotion regulation (EMOREG), and (6) normative restrictions of emotional experiences (NREMOE). In sum, mothers participating in this study responded to 36 items using a five-point Likert scale ranging from 0 (“not at all”) to 4 (“completely”); e.g., “I can easily distinguish my mental state”. An average score ranging from 0 to 5 is produced for each subscale. The higher the score, the more the person reports an openness to the emotional processes described in each subscale. The reliability of each of the six subscales is satisfactory and their Cronbach’s alpha ranges from .68 to .83 (Reichert et al., 2007).

### ***Mother-Child Conversations About Emotions***

We used the 24-item Questionnaire of Parent-Child Conversations about Emotions (QPCCE), developed by Mazzone and colleagues (2017c) to analyze the frequency of conversations about emotions that mothers have with their children. Mothers reported conversations frequency by answering a 5 points Likert scale: “0 time in the past two weeks,” “1–2 times in the past two weeks,” “3–4 times in the past two weeks,” “5 times or more in the past two weeks,” or “non-applicable” if the situation had not occurred. When answering the questionnaire, mothers were asked to base their answers in the past two weeks. The items refer to discussions where mothers have helped their child express and understand emotions (e.g., “When my child came home happy, we talked about how he or she felt”). The QPCCE targets four primary emotions: joy, sadness, fear, and anger. Prior to taking the test, mothers were told that there are no right or wrong answers. An average score (ranging from 0 to 4) of the frequency of exchanges is calculated; the higher the score, the more often the mother spoke to her child about emotions. This questionnaire has Cronbach’s alpha of .91 and a test-retest reliability coefficient of .60 (Mazzone et al., 2017c).

## Procedure

Mothers responded to a call for participants posted on social networks, in community organizations across Quebec, and in various private assessment and treatment clinics for families of children with ASD. Before beginning the study, the research team received ethics approval from the research ethics board of the Université du Québec à Montréal. Mothers, who gave their consent to participate in the study, completed all questionnaires online using a secure connection link.

## Statistical Analyses

We carried out descriptive analyses to describe the participants' scores for each questionnaire. Then, we carried out Pearson correlation analyses for all variables of interest: ToMI-t, ER subscale, QPCCE, five personality factors, CONREP, COMEMO, and EMOREG. We carried out hierarchical regression analyses with ToMI-t score and ER subscale score as dependent variables, frequency of emotion-related conversations as the independent variable. Finally, we made moderation analyses where we introduced each five factors, the CONREP, the COMEMO, and the EMOREG in separate models as moderators of the relationship of ToMI-t score, ER subscales score, and QPCCE score. We controlled for chronological age for each regression and moderation analyses. Z-scores were used for correlation and hierarchical regression analyses. We chose an alpha significance level of  $<.05$ . All analyses were carried out using SPSS Statistics (Version 26; IBM Corp., Armonk, NY, USA).

## Results

Descriptive analyzes, presented in Table 1, were conducted to summarize participants' scores on the ER subscale ( $M = 19.67$ ;  $SD = 3.20$ ), the ToMI-t ( $M = 10.87$ ;  $SD = 3.82$ ), the QPCCE ( $M = 1.57$ ;  $SD = 0.70$ ), the DOE (subscale : CONREP [ $M = 3.24$ ;  $SD = 0.62$ ],

COMEMO [ $M = 2.81$ ;  $SD = 0.46$ ], and EMOREG [ $M = 2.99$ ;  $SD = 0.53$ ]) and the EBMCF (subscales: extraversion [ $M = 5.55$ ;  $SD = 1.58$ ], agreeableness [ $M = 6.20$ ;  $SD = 1.39$ ], conscientiousness [ $M = 5.43$ ;  $SD = 1.66$ ], emotional stability [ $M = 5.11$ ;  $SD = 1.28$ ], and openness to experience [ $M = 6.43$ ;  $SD = 1.41$ ]).

[Table 1 should be placed here]

We conducted correlation analyses to explore the relationships between socio-emotional skills (emotional regulation and ToM), mother-child conversations about emotions, parents dimension of emotional openness (CONREP, COMEMO, EMOREG), and children's five personality factors. The results, summarized in Table 2, indicate that children's ER scores positively and significantly correlate with scores of conversations in QPCCE ( $r [48] = .29, p < .05$ ), with children's scores in ToMI-t ( $r [48] = .51, p < .01$ ) and children's extraversion ( $r [48] = .34, p < .05$ ). The results indicate that children's scores in ToMI-t positively and significantly correlate with children's ER score ( $r [48] = .51, p < .01$ ), extraversion ( $r [48] = .30, p < .05$ ), conscientiousness ( $r [48] = .40, p < .01$ ), and openness to experience ( $r [48] = .45, p < .01$ ). Scores of conversation in QPCCE negatively and significantly correlate to children's emotional ability ( $r [48] = -.29, p < .05$ ). Children's conscientiousness positively and significantly relates to children's emotional stability ( $r [48] = .38, p < .01$ ) and openness to experience ( $r [48] = .48, p < .01$ ), and negatively relates to mothers CONREP scores ( $r [48] = -.30, p < .05$ ). Children's openness to experience positively and significantly correlates with children's extraversion ( $r [48] = .53, p < .01$ ) and agreeableness ( $r [48] = .34, p < .05$ ). Mothers' regulation positively relates to mothers' communication and expressions of emotions ( $r [48] = .48, p < .01$ ).

[Table 2 should be placed here]

Firstly, to analyze the relation between mother-child conversations about emotions and the socio-emotional skills of children with ASD, we carried out linear regression analyses with conversations about emotions as an independent variable and children chronological age as a control variable (Table 3). The postulate of multicollinearity was respected. The results indicate that QPCCE is a significant predictor of emotional regulation when chronological age is controlled,  $t(45) = 2.35, p < .05$ . The model is significant and explains 16.7% of the variability of children's ER,  $F(45) = 5.48, p < .01$ . When controlling for age, the results indicate that scores of conversations in QPCCE significantly predict children's scores in ToMI-t,  $t(45) = 2.08, p < .05$ . The model is significant and explains 38.3% of the variability of children's scores in ToMI-t,  $F(45) = 15.91, p < .01$ .

[Table 3 Should be placed here]

Secondly, we conducted moderating analyses to explore the effect of children personality traits and mothers' emotional openness on the relation between mother-child conversations about emotions and socio-emotional skills of children with ASD. As shown in Table 4 and 5, results indicate that the moderation effect of children personality traits and mothers' representation of emotions are the only significant elements of the relation between ToM and conversations about emotions. The interaction of children conscientiousness and conversation scores in QPCCE negatively and significantly predict children's scores in ToMI-t,  $t(44) = -2.03, p < .05$  (Figure 1). The model is significant and explains 26% of the variability of children's score in ToMI-t,  $F(43) = 5.27, p < .01$ . The interaction of children openness to experience and their scores of conversations in QPCCE is a significant and negative predictor of children's score in ToMI-t,  $t(44) = -2.05, p < .05$  (Figure 2). The model is significant and explains 31.39% of the child's score in ToMI-t,  $F(43) = 6.70, p < .01$ . As for the mothers representation of emotion, its

interaction with the conversations score in QPCCE is a significant and positive predictor of the child's score in ToMI-t,  $t(43) = 3.57, p < .05$  (Figure 3). The model is significant and explains 29.41% of the variability of the child's score in ToMI-t,  $F(43) = 5.97, p < .05$ .

[Tables 4 and 5, and Figures 1, 2, and 3 should be placed here]

### Discussion

This study aimed to explore the relation between the socio-emotional skills of children with ASD and mother-child conversations about emotions while considering the possible moderating effect of characteristics of children and mothers. We based our analyzes on mothers' perception of their child socio-emotional skills and personality traits by using parent-report questionnaires. Mothers' perception are an important source of information because mothers are in a unique position to observe and interact with children across various situations in a day-to-day setting (Sachse & Von Suchodoletz, 2008). Likewise, mothers' perception can provide useful data on child development in research settings (Nordahl-Hansen et al., 2014). The main finding suggests that frequent mother-child conversations about emotions are associated with both higher perceived ToM and emotional regulation abilities in children with ASD. Moreover, children perceived personality traits and mothers' representation of emotions seem to moderate the relation between mother-child emotion-related conversations and ToM perceived abilities. These main outcomes will be discussed in the following.

As with TD children (Cui et al., 2020; Garner, 2006; Morelen & Suveg, 2012) and children with IDD (Jacob et al., 2019), our results suggest that mother-child conversations about emotions are positively associated with emotional regulation of children with ASD. This link can be explained by the fact that mother-child conversations about emotions are an opportunity for children to learn adapted strategies of emotional regulation, such as cognitive reappraisal

(Garner, 2006; Garner et al., 2008). Thus, the more frequently mothers engage in mother-child conversations about emotions, the more they report that their child with ASD has emotional regulation abilities. This is in line with scientific literature indicating that maternal ERSBs (e.g., mother-child conversations) contributes to the acquisition of emotional regulation skills in children. (Calkins and Johnson, 1998; Eisenberg et al., 1998). Our findings suggest that mother-child conversations about emotions are directly associated with perceived ToM abilities in children with ASD. Indeed, mothers of children with ASD who ask questions about their child's emotions and who provide explanations about emotions are more likely to report high-level ToM skills in their child. As suggested by Mazzone and Nader-Grosbois's (2017a) study, maternal discussions about emotions could help TD children to mentalize their emotions and those of others. For children with ASD, mother-child conversations about emotions could be a protective factor of ToM skills. Parental interventions could be essential for children with ASD to comprehend the causes and consequences of emotions (Jones et al., 2018). These results are consistent with conclusions drawn by Slaughter and colleagues' study (2007) indicating that affect clarifications are associated with the development of ToM abilities in children with ASD. Slaughter and colleagues' study (2007) highlights the link between maternal emotion-related discussions and ToM abilities in a specific storytelling setting whereas our study raises this link in a day-to-day setting (e.g., when children come back from school). Thus, our outcomes suggest that daily life maternal conversations about emotions may contribute to enhancing perceived socio-emotional skills in children with ASD. Our results corroborate the heuristic model of the parental socialization of emotion (Eisenberg et al., 1998). In this study, we did not use direct observation or test batteries to evaluate children emotional regulation and ToM skills. It was mothers who reported their appreciation of emotional regulation and ToM abilities of their child

with ASD with parent-report questionnaires. Therefore, mothers' perception of ToM and emotional regulation abilities of their child could be higher if they frequently converse with their child about emotions. Nevertheless, our findings corroborate with results of observational studies that emphasized the importance of language behaviors in the development of emotional regulation skills in children with ASD (Laurent & Gorman 2018). Moreover, our results are consistent with Richard's (2015) findings that indicate that frequent parent-child conversations about emotions, where parents use adjectives to describe emotions, predict a better score at a ToM battery test—administered by the researchers—in children with ASD.

In the present study, our findings suggest that children's personality traits can moderate the effect of maternal socialization behaviors on perceived ToM skills of children with ASD. These results are in line with Jones and colleagues' (2002) and Jacobs and colleagues' (2019) findings. Characteristics of children and mothers may moderate the influence of parental ERSBs on children's socio-emotional development (Jacobs et al., 2019; Jones et al., 2020). For children with ASD, conscientiousness and openness emerge as key factors to the influence of maternal emotion-related conversations on ToM abilities. Our findings suggest that adventurous, curious, and self-controlled children with ASD may need less maternal emotion-related conversations to be perceived by mothers as having high-level ToM skills. Self-controlled, curious, and adventurous children with ASD may acquire their ToM skills elsewhere than during maternal emotion-related conversations, such as by interacting with friends (Matthews, 2014). Yet, narrowed interest and impulsive children with ASD seem to benefit more from having frequent maternal discussions about emotions to develop their ToM abilities. As children with ASD tend to be less open to experiences and less conscientious of their sensations (e.g., emotional states) (Shcriber, Robins and Salomon, 2014), having frequent conversations about emotions could be

beneficial for them to acquire ToM skills. For children with ASD, being open to experience and conscientious of emotional and physical sensations may be a protective factor of ToM skills when mother-child conversations about emotions are less frequent. Furthermore, our results suggest that mothers who report having skills to conceptualize mental and bodily states regarding emotions—a characterization of positive openness to emotions—and having frequent mother-child conversations about emotions report high-level ToM skills in their child with ASD. Indeed, mother's ability to mentalize one's emotions seem to moderate the relation between mother-child conversations about emotions and ToM skills in children with ASD. One explanation for this finding may be that mothers' ableness to represent mental and bodily states could influence their willingness to initiate and take part in a discussion about emotions with their child (Lozada et al., 2015). Therefore, this may lead the mother to perceive their child as having high skills in ToM. As for emotional regulation, interestingly, results indicate no significant moderating effect of children personality traits and mothers' emotional openness. Emotional regulation is a skill that helps children to monitor, evaluate, and modify their emotional reactions to accomplish a goal (Thompson, 1994). Studies recognized that children with ASD can have difficulties doing so (Jahromi et al., 2012; Konstantareas and Stewart, 2006; Samson et al., 2015). Therefore, frequent maternal intervention through conversations about emotions may be needed to help these children manage their emotions regardless of children personality and mothers' openness to emotions. Finally, as for Nader-Grosbois and Mazzone's (2014) study, our results indicate that emotional regulation is positively associated with the child extraversion. The more children with ASD are perceived by their mother as extraverted, the more mothers report highly emotional regulation skills in their child. In summary, our findings suggest that children personality and

mothers' openness to emotions are two possible individual protective factors that moderate the influence of maternal ERSBs on ToM skills in children with ASD.

Due to limitations in our study, our findings need to be interpreted with caution. Indeed, an emphasis should be made on the exploratory setting of our research since no objective measures were used to assess children's ToM and emotional regulation skills. While rigorous procedures were used to confirm children's ASD diagnosis, we did not use the gold standard evaluation instruments (e.g., ADOS and ADI-R) in our study. Thus, children in our sample should be described as "children at risk of ASD". Furthermore, our description of ASD children characteristics is limited. We used one instrument to assess the cognitive, language and intellectual abilities of the children with ASD. Likewise, we did not access the full physicians and psychologists reports to give a broader description of heterogeneity traits of our children sample. Therefore, researchers should consider our limited description of heterogeneity traits when interpreting our findings. We decided to focus our study on maternal conversations about emotions to contribute filling the gaps in the scientific literature. However, we did not control for the influence of other parental ERSBs. Thereby, we cannot say that it is only mother-child emotion-related conversations that predicts the children socio-emotional skills. Future research needs to be conducted on the effect of mother-child conversations about emotions in children with ASD.

Future studies should include direct observations along with parent reports. Likewise, future studies should include an assessment of ASD symptoms with gold standard measures. Furthermore, future studies need to give a broader description of children level of symptoms, language, intellectual and cognitive abilities by using different instrument measures for each characteristic. Future studies should also control for the influence of other parental ERSBs.

Lastly, analyzing the content of parent-child conversations about emotions in future studies could be relevant. On one hand, when certain themes become recurrent, they may become too overwhelming and have a harmful effect on children (Fivush et al., 2009). On the other hand, a conversational approach including support when faced with emotions (e.g., the mother presents involvement and warmth) is associated with improved management of emotions (Cui et al., 2020).

Our study's findings contribute to scientific research by adding data regarding the effect of mother-child conversations about emotions on socio-emotional skills of children with ASD. Previous studies exploring the relation of parental ERSBs and socio-emotional skills of children with ASD mostly focus on parental reaction to emotions rather than parent-child conversations about emotions. Therefore, our study helps fill the gap that exists in the current literature by adding data on the role of mother-child emotion-related conversations in emotional socialization in children with ASD. To our knowledge, our study is the first to explore moderators' pathway in the relation of mother-child conversation and children's social competencies and behaviors in children with ASD. Results have potential clinical implications for health care professionals and behavioral interventionists working with parents who have a child with ASD. Indeed, in interventions, targeting maternal discussions about emotions may benefit children with ASD. For example, in a clinical setting, when a mother seeks help because of her ASD child's behavioral problems—that seems associated ToM or emotional regulation difficulties—professionals could suggest enhancing maternal discussion about emotions as an intervention tool. These conversations can be short—for example only to explain to their child how to recognize basic emotions such as anger.

### **Declarations**

**Ethics approval**

All the study design was approved by the Human Research Ethics Committee of University of Quebec in Montreal. (Ethics approval number: 2014\_A\_140022\_e\_224\_120)

**Consent to participate**

Informed consent was obtained from all individual participants included in the study.

**References**

- Alostaz, J., Baker, J. K., Fenning, R. M., Neece, C. L., & Zeedyk, S. (2021). Parental coping as a buffer between child factors and emotion-related parenting in families of children with autism spectrum disorder. *Journal of Family Psychology*. Advance online publication.
- American Psychiatric Association. (2013). *Diagnostic and Statistical Manual of Mental Disorders (DSM-5)*. American psychiatric publication.
- Baurain, C., & Nader-Grosbois, N. (2013). Theory of mind, socio-emotional problem-solving, socio-emotional regulation in children with intellectual disability and in typically developing children. *Journal of Autism and Developmental Disorders*, *43*(5), 1080–1097.
- Bougher-Muckian, H. R., Root, A. E., Coogle, C. G., & Floyd, K. K. (2016). The importance of emotions: the socialisation of emotion in parents of children with autism spectrum disorder. *Early Child Development and Care*, *186* (10), 1584–1593.
- Brumariu, L. E., & Kerns, K. A. (2015). Mother—child emotion communication and childhood anxiety symptoms. *Cognition and Emotion*, *29*(3), 416–431.

- Cai, R. Y., Richdale, A. L., Uljarević, M., Dissanayake, C., & Samson, A. C. (2018). Emotion regulation in autism spectrum disorder: Where we are and where we need to go. *Autism Research, 11*(7), 962–978.
- Calkins, S.D., & Johnson, M.C. (1998). Toddler regulation of distress to frustrating events: temperamental and maternal correlates. *Infant Behavior and Development, 21*, 379–395.
- Chevallier, C., Kohls, G., Troiani, V., Brodtkin, E.S., & Schultz, R.T. (2012). The social Motivation Theory of Autism. *Trends in Cognitive Sciences, 16*, 231–239.
- Cui, L., Criss, M. M., Ratliff, E., Wu, Z., Houlberg, B. J., Silk, J. S., & Morris, A. S. (2020). Longitudinal links between maternal and peer emotion socialization and adolescent girls' socio-emotional adjustment. *Developmental Psychology, 56*(3), 595–607.
- Denham, S. A., Zoller, D., & Couchoud, E. A. (1994). Socialization of Preschoolers' Emotion Understanding. *Developmental Psychology, 30*, 928–936.
- Eisenberg, N. (2020). Findings, issues, and new directions for research on emotion socialization. *Developmental Psychology, 56*(3), 664–670.
- Eisenberg, N., Cumberland, A., & Spinrad, T.L. (1998). Parental Socialization of Emotion. *Psychological Inquiry, 9*, 241–273.
- Falkmer, T., Anderson, K., Falkmer, M., & Horlin, C. (2013). Diagnostic procedures in autism spectrum disorders: a systematic literature review. *European child & adolescent psychiatry, 22*(6), 329-340.
- Fivush, R., Marin, K. A., McWilliams, K., & Bohanek, J. G. (2009). Family Reminiscing Style: Parent Gender and Emotional Focus in Relation to Child Well-Being. *Journal of Cognition and Development, 10*, 210–235.

- Garner, P. (2006). Prediction of prosocial and emotional competence from maternal behaviour in African American preschoolers. *Cultural Diversity and Ethnic Minority Psychology, 12*, 179-198
- Garner, P. W., Dunsmore, J. C., & Southam-Gerrow, M. (2008). Mother-Child Conversations about emotions: Linkages to Child Aggression and Prosocial Behavior. *Social Development, 17*(2), 259–277.
- Gross, J. (2013). Emotion regulation: Taking stock and moving forward. *Emotion, 13*(3), 359–365.
- Hutchins T. L., Prelock P. A., & Bonazinga, L. (2012). Psychometric evaluation of the Theory of Mind Inventory (ToMI): a study of typically developing children and children with autism spectrum disorder. *Journal of Autism and Developmental Disorders, 42*(3), 327-41.
- Jacobs, E., Mazzone, S., Simon, P., & Nader-Grosbois, N. (2019). The unexpected impact of parental emotional socialization on Theory of Mind and Emotion Regulation: The case of children with intellectual disabilities. *Psychology, Special issue on developmental psychology, 10*, 1302-1332.
- Jahromi, L.B., Meek, S.E., & Ober-Reynolds, S. (2012). Emotion regulation in the context of frustration in children with high functioning autism and their typical peers. *Journal of Child Psychology and Psychiatry, 53*, 1250–1258.
- Jones, C. R., Simonoff, E., Baird, G., Pickles, A., Marsden, A. J., Tregay, J., ... & Charman, T. (2018). The association between theory of mind, executive function, and the symptoms of autism spectrum disorder. *Autism Research, 11*(1), 95–109.

- Jones, S., Eisenber, N., Fabes, R. A., & MacKinnon, D.P. (2002) Parents' Reactions to Elementary School Children's Negative Emotions: Relations to Social and Emotional Functioning at School. *Merrill-Palmer Quarterly*, 48(2), 133-159.
- Jordan, R., Kalvin, C. B., Ibrahim, K., & Sukhodolsky, D. G. (2021). Parent Emotion Socialization in Children with Autism Spectrum Disorder and Co-Occurring Anxiety. *Research on Child and Adolescent Psychopathology*, 49(1), 125-137.
- Konstantareas, M., & Stewart, K. (2006). Affect Regulation and Temperament in Children with Autism Spectrum Disorder. *Journal of Autism and Developmental Disorders*, 36, 143–154.
- Kochanska, G., Aksan, N., & Joy, M. E. (2007). Children's fearfulness as a moderator of parenting in early socialization: Two longitudinal studies. *Developmental Psychology*, 43(1), 222–237.
- Laible, D., & Song, J. (2006). Constructing Emotional and Relational Understanding: The Role of Affect and Mother—Child Discourse. *Merrill-Palmer Quarterly*, 52, 44–69.
- Laurent, A.C., & Gorman, K. (2018). Development of Emotion Self-Regulation Among Young Children with Autism Spectrum Disorders: The Role of Parents. *Journal of Autism and Developmental Disorders*, 48(4), 1249–1260.
- Lozada, F. T., Halberstadt, A. G., Craig, A. B., Dennis, P. A., & Dunsmore, J. C. (2015). Parents' Beliefs about Children's Emotions and Parents' Emotion-Related Conversations with Their Children. *Journal of Child and Family Studies*, 25(5), 1525–1538.
- Ordre des psychologues du Québec et Collège des Médecins. (2012). *Les troubles du spectre de l'autisme, l'évaluation clinique : lignes directrices*.  
<https://www.ordrepsy.qc.ca/documents/26707/63191/spectre-de-lautisme>

- Masi, A., DeMayo, M. M., Glozier, N., & Guastella, A. J. (2017). An overview of autism spectrum disorder, heterogeneity and treatment options. *Neuroscience bulletin*, 33(2), 183-193.
- Matthews, N. L. (2014). Is it all in the family? the importance of siblings and peers for theory of mind and school readiness in children with and without Autism Spectrum Disorder. *Dissertation Abstracts International: Section B: The Sciences and Engineering*, 74(11), No pagination specified.
- Mazzone, S., & Nader-Grosbois, N. (2017a) Variability and Predictors of Mothers and Fathers' Socialization Behaviors and Bidirectional Links with Their Preschoolers Socio-emotional Competencies. *Journal of Behavioral and Brain Science*, 7, 621-653.
- Mazzone, S., & Nader-Grosbois, N. (2017b). How are parental reactions to children's emotions linked with Theory of Mind in children with Autism Spectrum Disorder? *Research in Autism Spectrum Disorders*, 40, 41–53.
- Mazzone, S., Roskam, I., Mikolajczak, M., & Nader-Grosbois, N. (2017c). Do parents talk about emotions with their children? The questionnaire of parent-child conversations about emotions (QPCCE). *Psychology*, 8(07), 987.
- Miller, A. L., Kiely Gouley, K., Seifer, R., Dickstein, S., & Shields, A. (2004). Emotions and behaviors in the Head Start classroom: Associations among observed dysregulation, social competence, and preschool adjustment. *Early Education and Development*, 15(2), 147-166.
- Miller, L. E., Perkins, K. A., Dai, Y. G., & Fein, D. A. (2017). Comparison of parent report and direct assessment of child skills in toddlers. *Research in Autism Spectrum Disorders*, 41, 57-65.

- Moffitt, J. M., Baker, J. K., Fenning, R. M., Erath, S. A., Messinger, D. S., Zeedyk, S. M., Paez, S. A., & Seel, S. (2021). Parental socialization of emotion and psychophysiological arousal patterns in children with autism spectrum disorder. *Research on Child and Adolescent Psychopathology*, 49(3), 401–412.
- Morelen, D., & Suveg, C. (2012). A Real-Time Analysis of Parent-Child Emotion Discussions: The Interaction Is Reciprocal. *Journal of Family Psychology*, 26, 998.
- Nader-Grosbois, N., & Mazzone, S. (2014). Emotion Regulation, Personality and Social Adjustment in Children with Autism Spectrum Disorders. *Psychology*, 5(15), 1750.
- Nordahl-Hansen, A., Kaale, A., & Ulvund, S. E. (2014). Language assessment in children with autism spectrum disorder: Concurrent validity between report-based assessments and direct tests. *Research in Autism Spectrum Disorders*, 8(9), 1100–1106.
- Nuske, H. J., Pellecchia, M., Kane, C., Seidman, M., Maddox, B. B., Freeman, L. M., ... & Mandell, D. S. (2020). Self-regulation is bi-directionally associated with cognitive development in children with autism. *Journal of Applied Developmental Psychology*, 68, 101139.
- Reichert M. Dimensions de l'ouverture émotionnelle (DOE). Concept théorique, instrument validation. 8th Congress of the Swiss Society of Psychology; 24 September; Fribourg. 1999.
- Reichert, M., Casellini, D., Duc, F., & Genoud, P. A. (2007). L' « Ouverture émotionnelle » dans les Troubles de la dépendance les Troubles de la personnalité [“Emotional openness” in addiction and personality disorders]. *Annales Médico-psychologiques*, 165(7), 485-491.

- Richard, E. (2015). *La socialisation parentale des émotions : comparaison de deux mesures d'évaluation des conversations parentales autour des émotions. Observations directe VS questionnaires* [Mémoire de master, Université catholique de Louvain].  
<http://hdl.handle.net/2078.1/thesis:3076>
- Roskam, I., de Maere-Gaudissart, A., & Vandenplas-Holper, C. (2000). Mise au point d'un instrument d'évaluation de la personnalité des enfants à partir du Modèle à Cinq Facteurs. *L'Orientation Scolaire Professionnelle*, 29, 661-672.
- Samson, A.C., Wells, W.M., Phillips, J.M., Hardan, A.Y., & Gross, J.J. (2015). Emotion regulation in autism spectrum disorder: evidence from parent interviews and children's daily diaries. *Journal of Child Psychology and Psychiatry*, 56(8), 903-913.
- Sachse, S., & Von Suchodoletz, W. (2008). Early identification of language delay by direct language assessment or parent report? *Journal of Developmental and Behavioral Pediatrics*, 29, 34-41.
- Schopler, E., Reichler, R.J., De Velus, R.F., & Daly, K. (1980). Toward objective classification of childhood autism: Childhood Autism Rating Scale (CARS). *Journal of Autism and Developmental Disorders*, 10, 91-103.
- Schriber, R. A., Robins, R. W., & Solomon, M. (2014). Personality and Self-Insight in Individuals with Autism Spectrum Disorder. *Journal of Personality and Social Psychology*, 106, 112-130.
- Shields, A., & Cicchetti, D. (1997). Emotion Regulation Among School-Age Children: The Development and Validation of a New Criterion Q-Sort Scale. *Developmental Psychology*, 33 (6), 906-916.

- Slaughter, V., Peterson, C. C., & Mackintosh, E. (2007). Mind what mother says: Narrative input and theory of mind in typical children and those on the autism spectrum. *Child development, 78*(3), 839-858.
- Tingley, E. C., Gleason, J. B., & Hooshyar, N. (1994). Mothers' lexicon of internal state words in speech to children with Down syndrome and to nonhandicapped children at mealtime. *Journal of Communication Disorders, 27*(2), 135–155.
- Thompson, R. A. (1994). Emotion regulation: A theme in search of definition. *Monographs for the Society for Research in Child Development, 59*, 25–52.

Table 1. Summary of mean score for each subscale

Measures	<i>n</i>	<i>M</i> (SD)	Min.-Max
ER (0-96)	48	19.67 (3.20)	11–25
ToMI-t (0-20)	48	10.87 (3.82)	1–16
QPCCE (0-4)	49	1.57 (.7)	0–3
Extraversion (1-9)	49	5.55 (1.58)	2–8
Agreeableness (1-9)	49	6.20 (1.39)	3–9
Conscientiousness (1-9)	49	5.43 (1.66)	1–9
Emotional Stability (1-9)	49	5.11 (1.28)	2–7
Openness (1-9)	49	6.43 (1.41)	2–9
CONREP (0-5)	48	3.24 (.62)	2–5
COMEMO (0-5)	48	2.81 (.46)	2–4
EMOREG (0-5)	48	2.99 (.53)	1–4

*Note.* ER = Emotion regulation; ToMI-t = Theory of Mind Inventory-total score; QPCCE = Parent-Child Conversations about emotions Questionnaire; CONREP= the conceptual representation of emotions; COMEMO = the communication and expression of emotions; EMOREG = emotion regulation

Table 2. Intercorrelation between children's emotion regulation, Theory of Mind, personality and mothers' dimensions of emotional openness and frequency of conversations on emotions

Measures	1	2	3	4	5	6	7	8	9	10
1. QPCCE	—									
2. ToMI-t	.19	—								
3. ER	.29*	.51**	—							
4. Extraversion	.15	.30*	.34*	—						
5. Agreeableness	-.07	.17	.22	.16	—					
6. Conscientiousness	.02	.40**	.06	.10	.12	—				
7. Emotional stability	-.29*	.02	.02	-.14	.16	.38**	—			
8. Openness to experience	-.05	.45**	.26	.53**	.34*	.48**	.13	—		
9. CONREP	-.09	-.23	-.09	.09	-.04	-.30*	-.12	-.07	—	
10. COMEMO	-.11	-.08	-.06	-.03	-.22	-.19	-.23	-.08	-.08	—
11. EMOREG	-.04	-.0	-.11	.08	-.26	-.13	-.15	.25	-.04	.48**

†\* $p < .05$ . \*\* $p < .01$ .

*Note.* ER = Emotion regulation; ToMI-t = Theory of Mind Inventory-total score; QPCCE = Parent-Child Conversations about emotions Questionnaire; CONREP = the conceptual representation of emotions; COMEMO = the communication and expression of emotions; EMOREG = emotion regulation.

Table 3. Regression model of predictors of the frequency of conversations about emotions, age of emotion regulation and Theory of Mind in children with ASD.

Predictors	Socio-emotional Skills							
	ToMI-t				ER			
	$\beta$	$t$	$R^2$	$F$	$\beta$	$t$	$R^2$	$F$
Model 1			.34	25.62**			.07	4.91*
Age	.59	5.06**			.31			
Model 2			.38	15.91**			.16	5.48**
Age	.62	5.38**			.33	2.5*		
QPCCE	.24	2.08*			.31	2.35*		

† \* $p < .05$ . \*\* $p < .01$ .

Note. ER = Emotion regulation; ToMI-t = Theory of Mind Inventory-total score; QPCCE = Parent-Child Conversations about emotions Questionnaire.

Table 4. Moderator effects of the child’s personality traits on the relation between conversations about emotions and emotion regulation, and Theory of Mind in children with ASD.

Predictors	Socio-emotional Skills							
	ToMI-t				ER			
	$\beta$	$t$	$R^2$	$F$	$\beta$	$t$	$R^2$	$F$
Model 1 a			.15	2.61			.18	3.27*
QPCCE	1.07	1.37			1.20	1.87		
Extraversion	.57	.09			.57	2.04*		
QPCCE X Extraversion	-.70	.15			-.26	-.66		
Predictors	$\beta$	$t$	$R^2$	$F$	$\beta$	$t$	$R^2$	$F$
Model 1b			.07	1.16			.14	2.51
QPCCE	1.13	1.41			1.42	2.21*		
Agreeableness	.52	1.26			.56	1.7		
QPCCE X Agreeableness	-.09	-.16			-.09	-.21		
Predictors	$\beta$	$t$	$R^2$	$F$	$\beta$	$t$	$R^2$	$F$
Model 1c			.26	5.27*			.09	1.50
QPCCE	.60	.83			1.21	1.80		
Conscientiousness	.77	2.52*			.06	.23		
QPCCE X Conscientiousness	-.72	-2.03*			-.18	-.54		
Predictors	$\beta$	$t$	$R^2$	$F$	$\beta$	$t$	$R^2$	$F$
Model 1d			.04	.67			.09	1.60
QPCCE	1.17	1.40			1.45	2.14		
Emotional Stability	.25	.56			.27	.73		
QPCCE X Emotional Stability	-.10	-.19			.15	.35		
Predictors	$\beta$	$t$	$R^2$	$F$	$\beta$	$t$	$R^2$	$F$
Model 1e			.31	6.70**			.18	3.27*
QPCCE	1.19	1.76			1.39	2.25*		
Openness to experience	1.10	3.21*			.56	1.80		
QPCCE X Openness to experience	-.92	-2.05*			-.43	-1.05		

† \* $p < .05$ . \*\* $p < .01$ .

Note. ER = Emotion regulation; ToMI-t = Theory of Mind Inventory-total score; QPCCE = Parent-Child Conversations about emotions Questionnaire.

Table 5. Moderator effects of mothers' emotional openness on the relation between conversations about emotions and emotion regulation and Theory of Mind in children with ASD.

Predictors	Socio-emotional Skills							
	ToMI-t				ER			
	$\beta$	$t$	$R^2$	$F$	$\beta$	$t$	$R^2$	$F$
Model 1a			.29	5.97*			.16	2.73
QPCCE	.59	.88			1.12	1.77		
CONREP	-.47	-.60			.07	.10		
QPCCE X CONREP	3.33	3.57*			1.68	1.9		
Predictors	$\beta$	$t$	$R^2$	$F$	$\beta$	$t$	$R^2$	$F$
Model 1b			.04	.74			.08	1.35
QPCCE	.98	1.28			1.29	1.97		
COMEMO	-.42	-.35			-.19	-.18		
QPCCE X COMEMO	.95	.55			.11	.07		
Predictors	$\beta$	$t$	$R^2$	$F$	$\beta$	$t$	$R^2$	$F$
Model 1c			.03	.58			.09	1.54
QPCCE	1.02	1.29			1.33	1.99		
EMOREG	.06	.05			-.55	-.62		
QPCCE X EMOREG	-.05	-.03			-.34	-.24		

† \* $p < .05$ . \*\* $p < .01$ .

Note. ER = Emotion regulation; ToMI-t = Theory of Mind Inventory-total score; QPCCE = Parent-Child Conversations about emotions Questionnaire; CONREP = the conceptual representation of emotions; COMEMO = the communication and expression of emotions; EMOREG = emotion regulation.

Figure 1. Moderating effect of children consciousness on the relation between mother-child conversations about emotions and children Theory of Mind perceived skills.

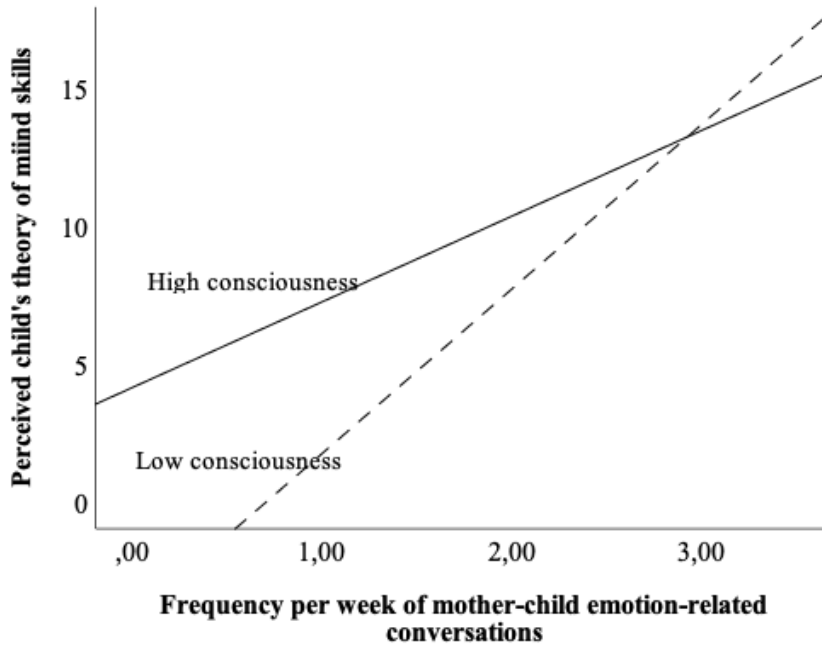


Figure 2. Moderating effect of children openness to experience on the relation between mother-child conversations about emotions and children Theory of Mind perceived skills.

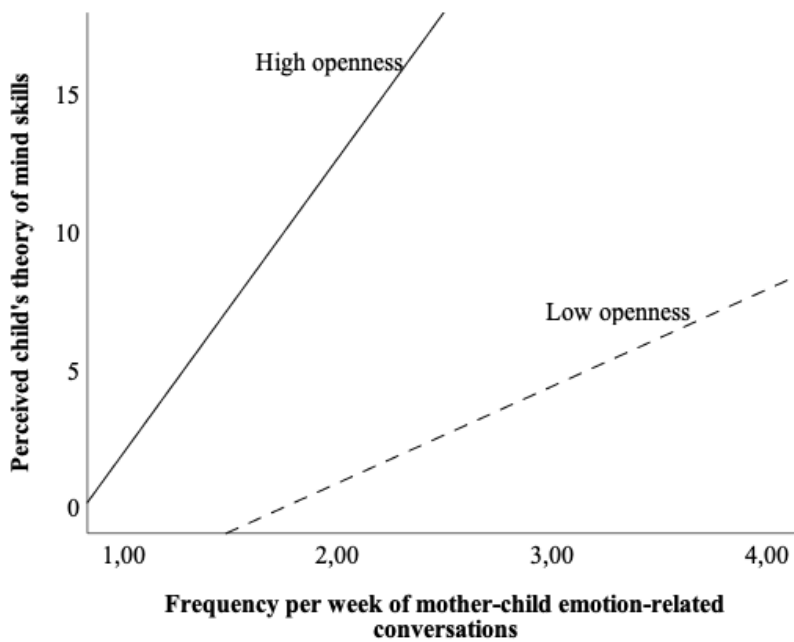


Figure 3. Moderating effect of mothers' conceptualization of emotion on the relation between mother-child conversations about emotions and children Theory of Mind perceived skills.

