Understanding, expressing, and interacting: the development of emotional functioning in young children with autism

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CHAPTER 6.

General discussion

It is never easy for an autistic person to live in a world which is predominantly non-autistic and full of social and emotional exchanges. Social communication and social interaction constitute one of the most challenging areas for many people with autism[1] (American Psychiatry Association, 2013). Emotion plays an essential role in guiding and facilitating social interactions (Lopes et al., 2011). From the functionalistic perspective (see Box 2 in Chapter 1), emotions are inherently informative and communicative. Experiencing an emotion signals us that something important to us is at stake (Frijda, 1986), and through expressing that emotion towards others, we communicate with others what we want to achieve (Horstmann, 2003). Although the ability to experience and express emotions are largely innate, which emotion is experienced and when and how this emotion should be expressed is constantly regulated by social and cultural norms (Kappas, 2013). To navigate smoothly in the social world, every child needs to learn from a young age the "rules" of social interactions, and how to manage emotions in a socially and culturally accepted way, so that emotions facilitate rather than hinder one's personal and social goals. For young children, the learning process often takes place through observing how parents respond in social interactions, having discussions over emotions with parents, and through interacting with peers and learning from trial and error (Mathieson & Banerjee, 2011; Westrupp et al., 2020). When compared to non-autistic children, autistic children more often miss out on these spontaneous learning opportunities and have more difficulties recognizing the "rules" of social interaction. This may not be a problem for some autistic children, who do not have a strong interest in connecting with others and prefer to spend time alone with their own imaginations and thoughts. Their preferences and choices should be accepted and respected. However, many other autistic children do have the desire to interact with others and make friends, and yet they often struggle with how to initiate and maintain social interaction, or may be put off by unpleasant experiences in the past, where the interaction "went awry" but they did not know why.

The predicament is partly because many autistic children interpret, express and respond to emotions in a different way from children without autism. Decades of research on autism have reported repeatedly that autistic people often experience difficulties in recognizing and responding to emotions of others as well as in regulating and expressing their own emotions (Lozier et al., 2014; Mazefsky et al. 2012). These studies contributed to our understanding of the wide variety of challenges that autistic people can face in social

[1] In this chapter, both person-first language such as "people with autism" and identity-first language such as "autistic people" are used. See Box 3 in Chapter 1 for justifications of using both types of language.

interactions, and enhanced our awareness about how complicated daily life experience can be for autistic individuals. This thesis hoped to build upon the existing research and knowledge and move one step forward. The unique contributions of this thesis include (1) focusing on a young sample, i.e., 1- to 6-year-old children with autism and their non-autistic peers, to obtain knowledge of the early condition and early development of autistic children in the emotional domain; (2) examining essential and diverse emotional abilities to establish an extensive profile of emotional functioning in preschool autistic children; (3) using a longitudinal approach to identify the changes of emotional functioning over time in autistic children and providing insights into cause-and-effect relationships regarding the contributing factors and the psychosocial outcomes related to emotional functioning.

The central aim of this thesis was to contribute to a more comprehensive understanding of the early development of emotional functioning in preschool children with autism and their differences in the emotional domain as compared to non-autistic peers. Understanding the challenges that autistic children face, truly accepting their differences, and acknowledging their potential is important for creating a supportive and respectful social environment around them, where autistic children can develop at ease and to their full potential. To achieve the goal, a multidimensional and multimethod approach was applied. Using a combination of tasks, on-site observations and parent questionnaires, four longitudinal studies were conducted to examine a group of key emotional abilities in preschool autistic children from both (1) the horizontal dimension: investigating the *interpersonal* differences and detecting the unique challenges that autistic children faced in the emotional domain; and (2) the vertical dimension: investigating the *intrapersonal* variations and following children's development over a period of two to three years. See also Figure 1 in Chapter 1 for a graphic presentation of the variables and chapter arrangement.

It is important to note that the outcomes of this thesis referred to the average performances of the autistic participants. The Linear Mixed Model (LMM) analyses adopted in this thesis have the advantage of taking into consideration individual differences when detecting the general trend of the group (Snijders & Bosker, 2011). As found in STUDY 1, 2 and 3, significant individual differences were observed in almost every aspect of emotional functioning. Notwithstanding, the quantitative approach adopted in this thesis did not allow us to gain detailed information on the capacity and the qualitative change within each child. As accurately pointed out by Doctor Stephen Shore, a professor of special education who focuses on matching best practices to the needs of people with autism, "If you've met one person with autism, you've met one person with autism" (Shore, 2018). The autistic population is as

heterogenous and diverse as the non-autistic population. What was found in this thesis should not be used to label autistic children. Instead, the findings of this thesis can be used as a starting point for eliciting more understanding of the challenges that autistic children may face at a young age. Each individual child with autism has his or her own characteristics, strengths, and special needs, and should be treated as a unique human being.

In this final chapter, first, the main outcomes are integrated and summarized to paint an overall picture of the early development of emotional functioning in autistic children. Next, the findings in each emotional domain are discussed in detail and in association with previous research. Third, considerations and directions for future research are discussed. This chapter concludes with associating the findings of this research and exploring their implications for societal practices.

Main outcomes

The horizontal dimension investigated the extent to which autistic children differed from non-autistic children in their emotional functioning. Differences were found in almost every aspect in the emotional domain. First, compared to non-autistic children, autistic children on average experienced more difficulties in recognizing and understanding the emotion of others (Chapter 2 & 4). It was also more challenging for many of them to regulate their own emotions. Emotion expression in autistic children was on average either more intensive or insufficient when compared to that of non-autistic children (Chapter 3 & 5). Besides, attending to the emotional display of other people was often not as automatic and effortless for autistic children as for their non-autistic peers (Chapter 4). Not surprisingly, many autistic children did not respond to others' emotional display in the socially expected ways to the same extent as their non-autistic peers (Chapter 4). These outcomes showed that participating in social interactions could be a very different experience for autistic children, which present many challenges and might bring a lot of stress. Indeed, on average, autistic children were viewed as less socially competent compared to their non-autistic peers and experienced more internalizing and externalizing problems (Chapter 4 & 5).

Despite the differences and challenges, remarkably, when looking at the vertical dimension, autistic children showed age-related improvement in almost every aspect of emotional functioning. Their ability to recognize emotions in prototypical situations as measured by behavioral tasks (Chapter 2) and in daily life as reported by parents (Chapter 4) all improved with age at the same rate as non-autistic children. Some emotional abilities, e.g., identifying happy and angry facial expressions (Chapter 2), prosocial actions observed in

behavioral tasks (Chapter 4), increased with even a greater magnitude in autistic children than in non-autistic children. These increasing trends convey a positive message, that is, like non-autistic children, many autistic children have the potential to learn and to improve in the emotional domain.

Worth noting, comparable levels and development were also found in autistic children for some emotional abilities. Regarding the development of attributing the emotion "fear" to fear-provoking situations (Chapter 2), the expression of pride in pride-provoking situations (Chapter 3) and parent-reported affective empathy (Chapter 4), the average levels and the developmental trajectories of autistic children did not differ from non-autistic children. The diverse patterns found in the development of different emotional abilities in autistic children suggest that it is important to investigate their emotional development at the molecular level instead of at the molar level. Not all emotional abilities were developed in a coordinated manner and some emotional abilities could be more affected by autism than others.

Decoding emotions in others: emotion recognition in autistic children

Social interactions start with perceiving and interpreting the emotions of another person. Correctly decoding emotional expressions of others is crucial for initiating adaptive and appropriate responding (Williams & Gray, 2013). Reversely, impaired emotion recognition disrupts social interactions and hinders one from establishing and maintaining positive relationships with others (Dede et al., 2021). Decades of research have examined emotion recognition in autistic individuals. Although the findings are not always consistent due to the heterogeneity of participant characteristics and task demands, overall, emotion recognition is found to be challenging for autistic individuals across a range of contexts and age groups (for a review, see Harms et al., 2010). These studies contributed greatly to our knowledge of the intergroup differences. However, relatively fewer studies examined emotion recognition in toddlers and preschoolers with autism. Besides, due to their cross-sectional designs, little is known about how emotion recognition develops within autistic individuals at different life stages (Rosen & Lerner, 2016).

To address the gap of knowledge and to start from an early life stage, three studies in this thesis examined the extent to which 1- to 6-year-old autistic children could recognize basic emotions and how their emotion recognition abilities developed over time. STUDY 1 (Chapter 2) zoomed in to examine three emotion recognition abilities (i.e., emotion differentiation, emotion identification, and emotion attribution) regarding four basic emotions (i.e., happiness, sadness, anger and fear). Behavioral tasks were used to examine whether

children could differentiate facial emotion expressions (emotion differentiation), to associate these facial emotion expressions to verbal labels (emotion identification), and to attribute emotions to emotion-provoking situations (emotion attribution). STUDY 3 (Chapter 4) and STUDY 4 (Chapter 5) examined emotion recognition in a more holistic manner. A questionnaire was used to ask parents how well their children could recognize basic emotions in others. Zooming in or zooming out, in line with the literature, all three studies confirmed that, on average, children with autism had more difficulties in recognizing basic emotions than children without autism, and these challenges were present already at a young age. Furthermore, STUDY 1 and STUDY 3 followed the development of emotion recognition abilities in children across four time points over a period of three years. Both studies found that emotion recognition abilities improved with age in both groups, and yet developmental gaps between autistic and non-autistic maintained over time.

Note that when looking at individual emotions and individual emotion-recognition abilities, the development gap was not always present. STUDY 1 found that autistic children did not differ from non-autistic children in attributing sadness and fear to emotion-provoking situations. Attributing emotions is a more complex ability and usually developed at an older age than differentiating and identifying emotions. It was unexpected to find that, while autistic children on average experienced more difficulties in differentiating and identifying emotions than non-autistic peers, they did not differ from non-autistic children in attributing negative emotions such as fear and sadness. As discussed in STUDY 1, the seemingly equivalent performances of the two groups in attributing negative emotions might be due to the still underdeveloped abilities of non-autistic children considering their young age. Future research following the development of emotion attribution over a longer period of time can inform us whether a gap between autistic and non-autistic children in attributing negative emotions starts to appear at older ages.

To summarize, this thesis confirmed that the challenges that many autistic children faced in emotion recognition were already present from a young age. Their challenges were global instead of emotion-specific. Compared to their non-autistic peers, autistic children on average experienced more difficulties in recognizing both positive and negative emotions in prototypical situations as examined by the behavioral tasks as well as in daily life as reported by parents. Remarkably, the emotion recognition abilities of autistic children all improved with age, and their ability to identify and attribute happiness and anger developed with even a larger magnitude than non-autistic children. The outcomes showed that, despite the

difficulties and challenges, autistic children had the capacity for improvement and the potential for catching up with non-autistic children in recognizing basic emotions.

Managing emotions in the self: emotion expression in autistic children

Emotions are often elicited during the interaction with other people (Van Kleef et al., 2016). People do not just passively experience emotions. Emotions are functional. They prepare us to deal efficiently with environmental demands (e.g., anger and fear prepare us to fight or flight in challenging situations), signal our emotional states to others and elicit responses (e.g., expressing shame and guilt to elicit forgiveness) (Scherer, 2000). However, emotions are functional only when the level of arousal and duration are under control and manageable. On the one hand, being overwhelmed by emotions, as indicated by elevated levels of negative emotion expressions, puts children at risk of developing behavior problems (Cole, Martin, & Dennis, 2004). On the other hand, nonchalance and lack of emotion expression when the situation demands it can jeopardize social relationships (Van Kleef & De Dreu, 2010). For example, when a social relationship is threatened by a transgression, expressing shame and guilt is necessary, which can help remedy the damage and elicit forgiveness (Leach, 2017).

In this thesis, two studies looked at emotion expression in children with autism. STUDY 4 (Chapter 5) used a parent questionnaire to examine the extent to which children expressed negative emotions such as anger, fear and sadness in daily life. STUDY 2 (Chapter 3) used behavioral tasks to observe children's expression of moral emotions including shame, guilt and pride in a lab setting. From the horizontal dimension, many children with autism were reported by parents as expressing more anger, fear and sadness whereas many were observed by the experimenters as expressing less shame and guilt than non-autistic peers. The heightened level of anger, fear and sadness expression is in line with previous findings that many autistic people have difficulties in regulating their emotional arousals. Living in a predominantly non-autistic world can often times be frustrating and overwhelming for autistic people (Jones et al., 2001). Not knowing how to deal with their intensive emotional arousals can make them vulnerable to experiencing emotional meltdowns and outbursts (Joshi et al., 2018).

In contrast to the heightened level of anger, sadness and fear expressions, children with autism showed an age-related decrease in their expression of shame and guilt, whereas the expression of shame and guilt remained stable in non-autistic peers. For non-autistic children, the fact that their expression of shame and guilt did not increase with age might result from their improved ability to regulate emotions and their growing understanding that

neither too much nor too little expression of emotions was functional. Nonetheless, the decreased shame and guilt expression in autistic children is puzzling. As discussed in STUDY 2, young children first experience moral emotions in an autonomous form (Stipek, 1995). Failing a task gives them the immediate feelings of frustration. With age the experience of shame and guilt becomes less autonomous and children attend more to other people's reactions. They realize that their failure or accomplishment can affect others and induce social disapproval or approval from others (Hart & Matsuba, 2007). Possibly, while the immediate frustration and distress induced by the failure of tasks fades over time in non-autistic children, they get a growing concern about how the other person would think of them. However, many children with autism might not be fully aware of the invisible social connections with other people, which in turn could compromise their experience and expression of shame and guilt.

Note, however, children with autism did not differ from children without autism in their expression of pride. This is probably because compared to shame and guilt, which demands children to understand another person's implicit attitude, pride relies less on an acute awareness and understanding of others' opinions and thus the situation is easier to process and less stressful for children with autism (Hobson et al., 2006).

Feeling, understanding and reacting to others' emotions: empathy in autistic children

Correctly interpreting the emotion of another person and meanwhile keeping one's own emotional arousal at control are prerequisites for initiating proper reactions in social interactions (Leppänen et al., 2001; Lopes et al., 2005). This is especially the case when considering the process of empathy. Empathy is a unique emotional process, where one's emotion is provoked by witnessing the emotional display of another ("affective empathy") (Decety & Meyer, 2008; Rieffe et al., 2020). Importantly, while resonating with another's emotion, one needs to be aware that the emotional dismals are not about oneself. The attentional switch from the self to the affected other ("attention to others") marks a crucial step in the empathy process (Bird & Viding, 2014; Rieffe et al., 2010). Only when the attention is switched to interpret the information relating to another, can the individual evaluate accurately how another person feels and why in that way ("cognitive empathy") (Baron-Cohen & Wheelwright, 2004; Dziobek et al., 2008). This in turn motivates and facilitates the person to react prosocially (Eisenberg et al., 2010), for example, to share another's pleasure or to ease another's distress ("prosocial actions").

STUDY 3 (Chapter 4) considered empathy as a multicomponent construct and examined the development of four key empathy components, i.e., affective empathy, attention

to others, cognitive empathy, and prosocial actions, in autistic children, using both parent questionnaires and observational tasks. When looking from the horizontal dimension, on average, autistic children were evaluated by both parents and experimenters as paying less attention to another's emotions and showing fewer prosocial actions than non-autistic peers. Besides, they were evaluated by parents as showing less understanding of others' emotions. These outcomes are consistent with the findings of previous studies. Reduced attention to social stimuli such as people, faces and body movements is repeatedly reported in autistic individuals of all ages (Chita-Tegmark, 2016). If an autistic child does not pay sufficient attention to the emotional stimuli, this could preclude the child from interpreting the emotional information correctly and in turn hinder him or her from reacting prosocially (Bal et al., 2009; Black et al., 2017).

Worth noting, while experimenters in our studies evaluated autistic children as on average showing less affective empathy than non-autistic children, parents reported equivalent levels of affective empathy. This disagreement echoes the discrepancy found in previous research between studies using observational tasks (e.g., Campbell et al., 2015; Dawson et al., 2004) and those using parent- and self-reports (e.g., Hudry et al., 2009; Pouw et al., 2013). Observational studies usually reported autistic people to display a lower level of affective empathy. However, according to parents and autistic individuals themselves, many autistic people do feel for others' emotions just as much as everyone else. In fact, although there is a stereotypical view that autistic people are "unempathetic" and indifferent to others, many parents reported that their autistic child was instead highly sensitive and resonated strongly with the emotions of the parent (Buruma & Blijd-Hoogewys, 2021). Sometimes the emotion resonation could be so fierce that the autistic child becomes overwhelmed (Smith, 2009).

What does this discrepancy tell us? Foremost, the finding on parent-reported affective empathy added to the existing evidence that autistic children did not lack the ability to feel for others' emotions. However, many factors can disrupt their empathy process. Among others, their troubled emotion recognition and proneness to overarousal might impede them from attending to the situation and reacting properly (Begeer et al., 2006; Gross, 2004). Not fully understanding what is going on while being exposed to the emotional display of another person can be overwhelming. Indeed, autistic people tend to avert their attention and use this as a regulating strategy to avoid becoming swamped by the intense social input, i.e., "out of sight, out of mind" (Markram & Markram, 2010; Tanaka & Sung, 2016). In observational tasks, the social demand of interacting with an adult stranger could be very taxing (Corbett et al. 2014; O'Connor et al., 2019). The average lower level of affective empathy observed in

autistic children might be the outcome of applying the avoidant coping. On the other hand, parents based their observations on their daily interactions with their child and the interactions of their child with other children. Presumably, these situations were more relaxing and thus could invite more emotional responses from autistic children. Furthermore, as noted by the "double-empathy problem", non-autistic people do not always understand the thoughts and feelings of autistic people (Milton, 2012). It is possible that the experimenters in the observational tasks had underestimated the extent to which autistic children felt for another, whereas parents might be more sensitive to detect the feelings of their children due to their long-term and close observations.

As discussed so far, many factors could disrupt the empathy process in autistic children, and yet their ability to feel for others was not absent. Moreover, they showed a great potential to learn and to improve. When looking at empathy from the vertical dimension, both cognitive empathy and prosocial actions showed age-related improvement in autistic children. Remarkably, their prosocial actions towards the experimenters in the observational tasks increased with a larger magnitude than non-autistic children. This again supports that autistic children were not indifferent to other people's agonies; otherwise no such great improvement would have been seen.

Psychosocial outcomes: longitudinal associations with emotional functioning in autistic children

Having seen the challenges that autistic children could face in the emotional domain, a question arose: would this in turn influence the development of their psychosocial functioning? The association between emotional competence and positive psychosocial outcomes has long been established in typical development (Trentacosta & Fine, 2010). In this thesis, two studies sought to find out whether the same association existed in autistic children. STUDY 3 (Chapter 4) examined the longitudinal associations between empathy development and the development of social competence and externalizing problems in autistic children, in comparison to non-autistic peers. STUDY 4 (Chapter 5) investigated the extent to which three important emotional abilities (emotion expression, emotion recognition and emotion vocabulary) influenced the development of internalizing and externalizing problems in children with and without autism.

In line with the literature (e.g., Bauminger et al., 2010; Salazar et al., 2015; Vickerstaff et al., 2007), on average, autistic children were viewed as less socially competent and they experienced more internalizing and externalizing problems than non-autistic peers.

Nonetheless, social competence improved with age in autistic children (STUDY 3); their externalizing problems were found to either remain stable (STUDY 4) or decreased (STUDY 3). Importantly, the development of emotional functioning was related to these positive changes. It was found that in autistic children, improved empathy, emotion recognition, emotion vocabulary and well-controlled emotion expression contributed to the advancement of social competence and preventing the development of internalizing and externalizing problems (STUDY 3 & 4). The contributing role of emotional functioning in promoting positive psychosocial outcomes highlights the importance of supporting the emotional development in autistic children from a young age.

The contributing factors to emotional development in autistic children

The most important contributing factor checked in this thesis was age. As discussed before, although many autistic children faced various challenges in the emotional domain, most of their emotional abilities kept growing throughout the years of measurement.

The contributing role of two other factors were examined in STUDY 1 (Chapter 2) and STUDY 2 (Chapter 3). STUDY 1 examined whether the autism symptom severity contributed to the development of emotion recognition in autistic children. Although some correlational studies found that more severe autistic traits were associated with lower emotion recognition ability (e.g., Brosnan et al., 2015; Evers et al., 2015; Xavier et al., 2015), when looking at the relation longitudinally, STUDY 1 did not find such a relation. STUDY 2 examined whether children's Theory of Mind (ToM) skills contributed to the development of moral emotions. Although ToM has been theorized as a prerequisite for experiencing moral emotions (Leary, 2004; Lewis, 2000), when looking at the association longitudinally, only one association was found in autistic children between better ToM and increased expression of pride.

The lack of strong association between symptom severity and the development of emotion recognition might be partly due to the measurement chosen in the study. The Social Responsive Scale (SRS; Constantino & Gruber, 2005) was used in STUDY 1 to measure the autism symptom severity in autistic children. The SRS is most appropriate for use with children from four to 18 years of age. Yet, many participants of this study were younger than four years. Therefore, the SRS might not be sensitive to detect autism symptom severity in such a young sample. In a similar vein, in STUDY 4, ToM was measured only by false-believe tasks and by parent reports on their children's understanding of basic emotions. These measures might not fully capture children's ability to understand the implicit attitude of other people.

Given the important role of emotional functioning in facilitating positive social interaction and promoting mental health, it is crucial to identify the protective and risk factors that influence the development of emotional functioning in autistic children. This thesis examined a few factors at the individual level, including age and autism symptom severity. Other individual factors such as cognitive ability and gender could also affect children's emotional development. Besides, beyond the individual level, factors at the family level and at the societal level can influence children's emotional development. These issues are discussed in the following sections.

Considerations and directions for future research

This thesis raises issues that future research can take into consideration. First, the focus of this thesis was on the development of emotional functioning in autistic children. Relatively little attention was paid to the contributing factors. However, knowing what promotes and hinders emotional development in young autistic children can provide vital information for parents, educators and clinical professionals, so they can support and facilitate the development of autistic children and help them reach their full potential.

At the individual level, in addition to age and diagnosis, children's intellectual and language abilities could influence their emotional development. A few studies which matched autistic and non-autistic children on verbal, non-verbal and full-scale IQ found that the group differences in emotional functioning disappeared (e.g., Castelli, 2005; Lacroix et al., 2014) However, when matching children on IQ, it often ends up with an older autistic group and a younger non-autistic group. As pointed out by Harms and colleagues (2010), an uneven IQ profile is phenotypically linked with autism. Removing the effect of IQ would remove some essential attributes linked with autism. Due to this consideration, this thesis did not match participants on IQ nor controlled for IQ when conducting the analyses. It should be noted that the autistic participants of this thesis all had normal intellectual abilities. However, if future research would include autistic children with intellectual disabilities, IQ could be an important factor for explaining the development of emotional functioning.

For the same reason, this thesis did not examine the effect of language. This was also because all the behavioral tasks used in this thesis were designed with caution to set minimal demands on language communication. However, language plays an important role in emotional socialization, the process during which children learn from their parents and environment how to understand emotions in a social context and how to express emotions in a socially accepted way (Kitzmann, 2012). Children listen to and observe how adults interact in

daily life. Besides, they use language to communicate about emotions and learn how to manage emotions through carrying out emotional conversations with parents and adults. Limited language can limit children's access to these learning opportunities. As found in STUDY 4 (Chapter 5), autistic children had on average a smaller emotion vocabulary than non-autistic children, and yet improved emotion vocabulary was a unique protective factor against the development of externalizing problems in autistic children. Future research could examine how language abilities, in particular the pragmatic aspects of language and emotion communication, contribute to the emotional development of autistic children.

Due to the very small number of autistic girls (about 10% of the total sample), this thesis did not examine whether there were gender differences in emotional functioning and emotional development. Girls with autism tend to receive their autism diagnosis later than boys with autism. Some of them may not receive this diagnosis at all (Gould & Ashton-Smith, 2011). This is partly due to girls' better social and emotional skills and higher tendency and ability to camouflage (Hull et al., 2019). Nonetheless, this does not mean that their struggles in daily life are of a lesser extent. In fact, due to their stronger motivation to interact with others and better awareness of the social rules and expectations, girls with autism may suffer more from loneliness, low self-esteem and they are at higher risk of developing depression and anxiety in teen years as compared to boys with autism and girls without autism (Holtmann et al., 2007; Rynkiewic & Łucka, 2018). The number of studies focusing on girls with autism has increased in recent years, reporting that the phenotypical profiles of girls with autism can be different from boys with autism (Duvekot et al., 2017; Werling & Geschwind, 2013). Future research should explore whether the gender differences are also present in early childhood regarding children's emotional development. Knowledge in this regard can benefit enhancing awareness of the unique characteristics of females with autism, providing them gender-tailored support and reduce their stresses on social occasions.

This thesis paid attention mainly to basic emotions, focusing on their expression and recognition. On the one hand, focusing on basic emotions matches the developmental stage of the young sample studied in this thesis. On the other hand, considering that moral emotions start to emerge and develop substantially in early childhood, capturing the developmental profile of moral emotions at this stage can deepen our understanding of emotional development in autistic children. This is especially the case after having discovered that while all the other emotional abilities increased with age in autistic children, the expression of shame and guilt showed a progressive decline. Future research on moral emotions in young autistic children could consider the following directions: (1) examining the underlying

mechanisms that contribute to the development of moral emotions in autistic children, such as the sense of self, self-other distinction and higher-order ToM (Immordino-Yang, 2011; Malti et al., 2014); (2) examining children's proneness to discrete moral emotions (e.g., examining shame and guilt separately) instead of investigating them at the global level, because different moral emotions are associated with different behavioral and psychological outcomes (Tangney & Dearing, 2003); (3) involving multiple informants and using multiple measures to investigate how other aspects such as the recognition and experience of moral emotions unfold at young ages in autistic children.

Societal implications

Navigating in a world full of emotional and social exchanges can be testing for any child. However, it is particularly challenging for those with autism. As shown by the outcomes of this thesis, autistic children were not in a favorable position when the situation required them to perceive, interpret and communicate emotions. Traditionally, the focus is on how to help autistic children change and to become "less autistic". This point of view neither accepts nor respects the fact that children with autism live a "different but not less" life. Furthermore, successful interaction requires efforts from both interacting parties. Instead of putting all the responsibilities on autistic children, finding a suitable way to interact with them, preventing social exclusion and reducing the negative impacts on their mental health is an ineluctable responsibility of everyone living in the society.

While this thesis focuses on emotions, the challenges that autistic children face are not confined to the emotional domain and permeate into every aspect of their life. To them, the world can be a mass of people, relations and events that do not always make sense. Above this, the misunderstanding and rejection from non-autistic people often make the situation even more challenging and stressful. Although the majority of the general population is non-autistic, this does not give them the privilege to demand and await autistic people to change and fit to the non-autistic world. Imagine the world was predominantly autistic, would non-autistic people perform better? Probably not. In the Theory of Double Empathy, Doctor Damian Milton pointed out that the lack of ToM and empathy is mutual (Milton, 2012, 2020). While autistic people may struggle to process and understand the intentions and emotions of non-autistic people in social interactions, non-autistic people are equally incapable of understanding the thoughts and emotions of autistic people. It is time that the non-autistic people make changes and adjustments. The attitude could be more understanding, respectful,

and open-minded. The behaviors could be more friendly and more caring. The environment could be more adapting and welcoming.

Importantly, when people's attitude becomes more respectful and understanding, and when the social environment becomes more inclusive and welcoming, it opens the gate to the optimal and most natural learning environment for autistic children to develop their emotional skills. An important finding of this thesis is that most emotional abilities of autistic children developed at a similar rate as non-autistic children. Some of their emotional abilities developed with even a greater magnitude than their non-autistic peers. This shows that autistic children did have the potential to learn and to improve. It should be mentioned that all the autistic participants and their parents were involved in a supporting program conducted by the Center for Autism, Leiden, the Netherlands, which was a rehabilitation center specialized in diagnosing and supporting autism. An important approach adopted at the center was to teach parents how to understand and react to the behaviors of their autistic child. The positive outcomes observed in our autistic participants could partly result from the caring and learning home environment created by parents.

Such caring and learning environment should not be confined just to home and with parents. Autistic children have the same right to every learning opportunity as non-autistic children. In addition to introducing autistic children to training programs and putting considerable pressure and responsibility on parents, it is vital to educate peers and everyone around about the uniqueness and value of autism (Tipton & Blacher, 2014), to promote true acceptance and understanding (Jones et al., 2021), and to encourage schools and societies to create an inclusive physical and mental environment (Rieffe et al., 2018), where autistic children can enjoy, feel supported and welcomed, not only survive but also thrive in the future.

Conclusion

This thesis aimed to strengthen our understanding of the early development of emotional functioning in preschool children with autism. On the one hand, this thesis confirmed the challenges and difficulties that many autistic children faced in the emotional domain. These challenges were present already from a young age and persisted over time. Despite the difficulties and challenges, remarkably, most emotional abilities of autistic children increased with age and developed in a similar way as found in non-autistic children, showing that autistic children had the potential to learn and to improve. Receiving the diagnosis at the youngest possible age and receiving the needed support in the right way and promptly is vital

for stimulating their emotional development. Meanwhile, it is equally important to enhance autism awareness among non-autistic people, and create a learning, motivating, respectful and inclusive social environment, where autistic children can develop at ease and to their full potential.

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