Being deaf at the playground: the effects of hearing loss on children's social participation

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BEING DEAF
AT THE PLAYGROUND

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Chapter 1

General Introduction

Social functioning is a critical part of children's development, as interactions with others enables children to understand their own and others' emotions, form connections and friendships, acquire social norms, and develop a sense of belonging (Bedell & Dumas, 2004; Law, 2002; Saarni, 1999). Living in a predominantly hearing environment, deaf or hard-of-hearing (DHH) children frequently often encounter both intrinsic (e.g., difficulties in speech perception and/or production) and extrinsic (e.g., noisy environments, lack of awareness from others') barriers, which can negatively impact their social functioning, even after auditory restorative interventions (Jiam et al., 2017; Pisoni et al., 2017). These factors can result in fewer opportunities for incidental learning, i.e., unintentional or unplanned learning from the social environment that typically arise by observing or overhearing others' social interactions (Bandura, 1977; Kelly, 2012).

Although incidental learning opportunities occur every day, accessing them can be more challenging for many DHH children, which can negatively impact their socioemotional development (Moeller, 2007; Rieffe et al., 2015). For example, free play situations which mainly occur at the playground, are especially important for children's development. Yet, they can be particularly challenging for DHH preschoolers due to their complexity, unstructured, and often noisy nature. These aspects may cause DHH preschoolers to miss out one of the most important experiences for social learning with their peers. Consequently, DHH preschoolers often struggle with aspects typically learned through incidental learning, such as recognizing, expressing, and communicating emotions (Kouwenberg, 2013; Wang et al., 2011; Wiefferink et al., 2012, 2013).

Despite significant technological advancements which prompted significant improvements in hearing aids (HA) and cochlear implants (CI), the auditory environment accessible to DHH preschoolers who use them is not comparable to their hearing peers. For example, CI users often report difficulties in decoding speech in noisy environments, locating where sounds are coming from, and perceiving prosodic cues (Jiam et al., 2017; Pisoni et al., 2017). These challenges can hinder DHH preschoolers' interactions with their peers, especially in group settings, as conversations might go too fast, background noise could make it harder to understand and locate who is talking, which can become overwhelming. Previous studies have consistently reported that DHH children encounter greater challenges in initiating and sustaining peer interactions (Martin et al., 2011). Specifically, DHH children typically engage in fewer and briefer social interactions, and their social networks are generally more fragile compared to those of their hearing peers

(Brown et al., 2008; Wauters et al., 2008). These factors often lead to feelings of isolation, frustration and low self-esteem that are often reported by DHH children and adolescents (Kouwenberg et al., 2012; Leigh et al., 2009; Martin et al., 2011; Peterson et al., 2016).

This is the current knowledge regarding social functioning of DHH children. However, research on the topic has yet to accompany the advances in technology and education that have been made over the past decade. Therefore, the studies in this thesis aim to provide up-to-date knowledge regarding social functioning of DHH preschoolers. In this chapter, the first focus will be on the primary context in which social functioning can be observed: the playground. Next, the focus will be on the primary activity that children use to interact with others: play. Lastly, due to their interrelation with social functioning, emotional functioning and social skills will be focused. Considering the interrelation of social functioning with children's overall development and the worrying findings from studies with DHH children, the current thesis can provide insights for social integration and support of these children.

WHAT HAPPENS AT THE PLAYGROUND?

A comprehensive method to understand children's social functioning is the observation of their play and peer interactions on playgrounds. Through the observation of naturalistic interactions—without adult interference —one can understand each child's particular interest while playing, the dynamics between peers, their positioning in the social group, and their abilities to enter and maintain interactions (Heravi et al., 2018; Veiga, de Leng, et al., 2017; Veiga, Ketelaar, et al., 2017). However, playgrounds are often neglected as a valuable context for studying child development (Pellegrini & Bohn, 2005), and this kind of research is even rarer with DHH preschoolers. Most research in this field dates from 25 to 45 years ago (see Antia et al., 2012, for a review) and reports that DHH children exhibit different behaviours on playgrounds compared to their typically hearing (TH) peers. This suggests that the constraints they face in accessing the social world affect their social functioning (Antia et al., 2012). The few studies that focused on playground behaviours of DHH children revealed that these children establish fewer and shorter social interactions than hearing children, and - when available – they predominantly interact with other DHH children (Antia et al., 1998; Brown et al., 2008).

This tendency has been attributed to the shared communication mode, that is, when two DHH children want to interact they tend to use similar methods - usually nonverbal – to initiate and maintain an interaction. In contrast, attempts by DHH children to interact with hearing peers are often ignored. Note that hearing peers can form a barrier for social participation, as DHH children are less often invited or allowed to join in play, and hearing children are overall less willing to initiate interactions with DHH children (Deluzio & Girolametto, 2011; Guralnick et al., 2006; Levine & Antia, 1997).

Children can broadly show three types of behaviours on the playground: non-social (i.e., solitary and onlooking), parallel, and/or social (Coplan & Bowker, 2014; Parteni, 1932; Rubin et al., 1978). Studies show that DHH preschoolers spend more time alone at the playground than their hearing peers, and prefer peripheral areas away from group interactions (Levine & Antia, 1997). Thus, the predominant behaviour that DHH preschoolers show at the playground is onlooking behaviour, i.e., they hover around, observing others without joining in (Lowe Vandell & George, 1981). Previous studies with hearing children have linked these reticent behaviours to less well-developed emotional skills, and also show that these passive behaviours may arise from fear and uneasiness about how others may react (Coplan & Bowker, 2014; Henderson et al., 2004). Thus, similarly to their hearing peers the tendency of DHH preschoolers to observe the group may very well indicate that they have an interest in interacting with the peers, but are mostly fearful of doing so to avoid conflicts and rejection, caused by the constant rejection that they face by hearing peers (Henderson et al., 2004; Kouwenberg et al., 2012; Peterson et al., 2016).

PLAYING THROUGH BARRIERS

Play is a crucial activity for child development; it is so important that the Convention on the Rights of the Child (1989) recognized it as a fundamental children's right. Play is defined as 'a spontaneous, pleasurable, and self-guided activity' that provides children with unique opportunities for their overall development (Montessori, 1989; Pellegrini, 2009; Piaget, 1951; Vygotsky, 1967). However, for children who face communication barriers—such as DHH children— engaging in different types of play can be a serious challenge (Antia et al., 2012). During play, linguistic competence is important for

maintaining social interactions. Yet, the extensive auditory and kinetic stimulation, along with the rapid change of contacts and rules that occur during play, make DHH preschoolers' participation in play more difficult (Brown et al., 2008; Rieffe et al., 2015).

In this thesis two major forms of play will be focused: physical play and pretend play (Pellegrini, 2009; Pellegrini & Smith, 1998). Physical play can be characterized by a moderate to vigorous physical activity that can be divided into exercise play (e.g., running, climbing) and rough-and-tumble play (e.g., chasing, play-fighting, etc.) (Pellegrini & Smith, 1998). Pretend play can be characterized by a symbolic and playful transformation of something into something else, which can be split into role play (i.e., when an object is converted into something else) and fantasy play (i.e., impersonating someone else) (Fein, 1981; Lillard et al., 2013; Lindsey & Colwell, 2013).

Children's engagement in different types of play is largely influenced by their individual skills. Although research on the topic is limited, studies have shown that compared to their hearing peers, DHH tend to avoid engaging in types of play that heavily depend on verbal communication and social skills, such as pretend play (Brown, 2001; Brown et al., 1997; Levine & Antia, 1997). Furthermore, although earlier studies suggested that DHH children had motor difficulties (Savelsbergh et al., 1991), more recent research has shown that, despite possible balance deficits, DHH and hearing children show similar levels of motor competence (Engel-Yeger & Weissman, 2009). In fact, Higginbotham and Baker (1981) suggest that one specific form of physical play—exercise play—could help DHH children to organize and maintain interactions.

Despite the critical role of play in children's development, to date, only few studies have focused the engagement of DHH preschoolers in play, with most existing research targeting pretend play. Since physical play does not require complex receptive or expressive communication skills, it is worthwhile to understand the involvement of DHH preschoolers in this specific type of play and its importance for their social participation and overall development.

THE INTERPLAY BETWEEN SOCIAL FUNCTIONING AND EMOTIONAL DEVELOPMENT

Research has consistently demonstrated that DHH children often experience more social and emotional problems compared to their hearing peers (e.g., Kouwenberg, 2013; Rieffe, 2012; Stevenson et al., 2015). But how does social functioning relate to their emotional development?

As previously mentioned, DHH children encounter several barriers in accessing the social world around them, which limits their opportunities to learn about self and others' emotions. For example, DHH preschoolers exhibit difficulties in identifying, expressing, and communicating emotions, as well as lower emotion regulation abilities compared to their hearing peers (Rieffe, 2012). Specifically, DHH children struggle more with regulating negative emotions and are often reported to experience more internalizing, externalizing, and aggressive problems (Kouwenberg, 2013; Sorkin et al., 2015; Theunissen et al., 2015; Wiefferink et al., 2012). Note that DHH children might not be intrinsically aggressive but might lack effective coping strategies to deal with frustration from the overwhelming feeling of being lost in the social world (Rieffe, 2012; Rieffe & Terwogt, 2006). Furthermore, the damaging effect of aggressive behaviours on relationships with peers could be further exacerbated in DHH children, who are known to have specific difficulties with empathic and moral evaluation abilities, that is, in social emotions (Ketelaar et al., 2013, 2015; Kouwenberg, 2013; Wiefferink et al., 2012).

Contrary to basic emotions (e.g., happiness, sadness, fear, surprise) which are biologically hardwired in humankind, social emotions (e.g. empathy, shame, guilt, pride) are highly influenced by social learning and cultural context (Eid & Diener, 2001; Johnson-Laird & Oatley, 1989; Shaver et al., 1987; Tracy & Robins, 2004). Thus, development of social emotions can be more difficult for DHH preschoolers, since it requires social exposure, self-awareness, and the interpretation of the social context (Rieffe et al., 2005). These aspects can pose a serious challenge for DHH preschoolers' inclusion in the peer group, as social emotions are important for navigating daily life interactions, helping children to adhere to social norms, promoting prosocial behaviours and overall helping them understand the social environment (Blasi, 1999; Hoffman, 1987, 2001; Tangney et al., 2007). A deeper understanding of the interplay between social

functioning and social emotions, namely empathy and moral emotions, in DHH preschoolers is thus necessary.

The role of empathy

Empathy, often referred to as "the social-glue of human relationships", is a crucial aspect of social interactions throughout life (Hoffman, 1987). It can be defined as the ability to share others' emotional states and show concern for them (Hoffman, 2001). From birth until the preschool years children go through three subsequent, yet not mutually exclusive levels of empathy: emotion contagion, attention to others' emotions, and prosocial actions (Hoffman, 1987). Although the initial signs of empathy are assumed to be innate, developing this critical skill requires social exposure and practice, which is not equally accessible to all children, as it is the case of DHH children (Davidov et al., 2013; de Waal, 2008; Decety et al., 2016). Previous studies have shown that DHH children showed lower levels of overall empathy compared to their hearing peers (Peterson et al., 2016). Yet, studies that distinguished between the three levels of empathy have shown that DHH children and adolescents tend to show higher levels of attention to other's emotions and fewer prosocial actions (Ketelaar et al., 2013; Netten et al., 2015).

The role of moral emotions

Morality is another aspect that is dependent on social participation, and thus could be affected in DHH children. Moral emotions arise when people feel judged, expect to be judged by others, or judge their own behaviour (Tangney et al., 2007; Tracy et al., 2007). Within the spectrum of moral emotions, shame and guilt are considered to be self-conscious emotions (Tracy et al., 2007; Tracy & Robins, 2004). Self-conscious emotions are those that require a self-evaluative process, in which the individual continuously evolves according to the social norms (Tracy et al., 2007; Tracy & Robins, 2004). The experience—or even anticipation—of these emotions serves as a behaviour regulation mechanism, urging people to abide by the rules and to avoid committing moral transgressions (Blasi, 1999; Tangney et al., 2007). The development of moral emotions accompanies self-concept development, as children need to distinguish themselves from others and focus on their individual actions to evaluate whether their behaviours align with societal norms and values (Hart & Matsuba, 2007). This learning process occurs through the daily interactions that children have. More specifically, since birth, children

experience and observe behaviours of aid and harm from their families toward them, as well as between other people, which guides them to understand what is right or wrong (Dahl, 2015; Hammond et al., 2017). Although research is scarce, one study has shown that DHH infants and preschoolers showed levels of moral emotions compared to their hearing peers (Ketelaar et al., 2015).

BOX 1. Deaf and Hard of Hearing Children in Portugal

Neonatal hearing screening

Current data shows that annually, about 85,000 babies are born in Portugal (INE, 2024). Among these newborns, about 0.1% are born with a hearing impairment, which results in roughly 85 DHH children being born per year (Gabriel et al., 2017; RANU, 2007). In efforts to ensure that these children receive early support that mitigates difficulties in language and social integration, the Portuguese government – aligned with other European countries – implemented the universal neonatal hearing screening program for all children born in national territory (RANU, 2007). Although this program began as a pilot study in early 2000s, it was designed to detect auditory impairments in children from high-risk groups, and only in 2004 it became available for all children (RANU, 2007). Public health data shows that the screening program is widely successful in Portugal, with more than 95% of newborns being tested every year (Gabriel et al., 2017). This early screening program is conducted in the first 30 days of the child's life – ideally before hospital discharge - and aims to detect hearing loss equal or higher than 35 dB in the best ear (DGS, 2015; RANU, 2007).

Follow up

Upon detection of hearing loss, a follow up evaluation is scheduled - before 3 months of life -, to confirm the diagnosis, determine the type and severity of hearing loss. Subsequently, a multidisciplinary team (i.e., paediatricians, otolaryngologists, audiologists, nurses, speech therapists, and psychologists) will discuss a rehabilitation and intervention plan with the caregivers, who can accept or decline (DGS, 2015). There are several possible scenarios depending on each individual case, however for the purpose of this thesis we will only be discussing intervention with Hearing Aids (HA) and Cochlear Implants (CI) in children with bilateral hearing loss.

Devices for early intervention

Children with mild, moderate and severe hearing loss often benefit from hearing aids, who amplify sound to make it louder and clearer (Hampson, 2012). These devices are only applicable to DHH children whose residual hearing is sufficient to be used to train language and communication skills

(Hampson, 2012). In contrast, cochlear implants are more recommended for DHH children with severe-to-profound hearing loss who gain limited benefit from hearing aids (Clark, 2003). CIs are devices that directly stimulate the auditory nerve, bypassing the damaged parts of the ear and providing a sense of sound that can significantly enhance the ability to perceive and produce speech (Clark, 2003). However, before achieving the minimum age of implantation, DHH children benefit from hearing aids. Note that both devices are financed by the Portuguese National Health Service, upon medical recommendation (ISS, 2024). After getting a CI or HA, the process continues with follow-up monitoring and adjustments on these devices to ensure that the hearing is adjusted to the child's needs (DGS, 2015). Regardless of their hearing device, all DHH children are enrolled in early intervention programs, mainly focused on speech therapy and educational support, to maximize their communication abilities (DGS, 2015; RANU, 2007). In parallel, at an initial stage, parents receive training on how CI and HA work, and how to stimulate communication with the DHH child at home (DGS, 2015). These intervention programs have a minimum duration of 6 months.

Education / School System

Currently, most Portuguese DHH children attend reference, mainstream schools. The majority of DHH children in Portugal attend mainstream schools, although specific data regarding the annual distribution among educational institutions is lacking. There are currently 17 reference schools which are part of the Portuguese national educational system and offer specialized teachers and curriculum, alongside a mainstream curriculum to promote inclusion of DHH children in classes with hearing children (DGE, 2014; DGIDC, 2009). These schools maintain the same curriculum for all students irrespective of hearing status, but adapt the educational approaches to facilitate a bilingual experience, by combining oral and sign language (DGE, 2014; DGIDC, 2009). Furthermore, at these schools DHH and hearing children have moments together in class, but also separate (DGE, 2014; DGIDC, 2009). In contrast, the situation in mainstream schools is heterogeneous, and the information is limited. While DHH students in mainstream settings may receive speech therapy – in school or in private settings - if prescribed by their reference medical professionals, access to sign language and a bilingual curriculum is often restricted within the school environment.

THIS THESIS

The preceding topics have introduced the general understanding we have about DHH children's social functioning. Yet, it is important to consider that this is a heterogeneous group, with diverse needs and characteristics. In this particular thesis, the focus will be on the Portuguese population, where studies with DHH children have so far mainly focused on language and academic skills (Ferreira, 2012; Martins, 2009; Pereira, 2014). To the best of our knowledge, this is thus the first study to focus on social

functioning of DHH Portuguese preschoolers. Currently, the majority of Portuguese DHH preschool children attend mainstream preschools, where they are primarily surrounded by hearing peers (BOX 1). Nevertheless, the Portuguese health system is strongly committed to ensure early – and the most appropriate (CI *versus* HA) – rehabilitation intervention for all DHH children (BOX 1). All these aspects are aimed to contribute to overall development of DHH children which might influence their social functioning.

Research aim

The current thesis aims to investigate social functioning of Portuguese DHH preschool children in the context of their peer group. Understanding social functioning at preschool age is of major importance since it can be a predictor of future maladjustment. Note that, during preschool years children start spending less time with their families, and more time with their peers. This puts peer interactions at the core of their daily-social-lives, with peers becoming the ones with whom preschoolers can primarily practice and develop their skills. More specifically, understanding whether and how social functioning of DHH and hearing preschoolers differ can better guide development of early and more targeted interventions to prevent the social maladjustment in children from young ages.

To achieve this goal the extent to which DHH preschoolers differ from their hearing peers in regards to play and playground behaviours will be explored. Subsequently, the current work will examine the extent to which DHH preschoolers differ from their peers regarding emotional functioning and social skills, which are all intrinsically linked to social functioning. Through a combination of observational studies with perspectives of caregivers, teachers and children themselves, the current thesis aims to contribute to the limited body of knowledge on social participation of DHH preschoolers. Furthermore, this thesis aims to offer practical insights into the social integration and development of DHH children, proposing strategies that promote equity for this population.

Chapter 2 will reflect on the role of play, particularly physical play, for children's socioemotional development, emphasizing its importance for DHH preschoolers. **Chapter 3** will be used to describe the spontaneous playground behaviours of DHH preschoolers integrated in mainstream preschools, focusing on social levels, type of activities, and type of play involvement during recess time. Chapter **4** will describe the

adaptation and validation of the Empathy Questionnaire (EmQue; Rieffe et al., 2010) for the Portuguese preschool population. This study will precede **Chapter 5,** which focused on potential differences in empathy levels of DHH and hearing preschoolers, and the unique associations of these empathy levels with emotional competence. In **Chapter 6,** the interrelation between externalizing problems, namely reactive and proactive aggression, and social participation in hearing preschoolers will be investigated. **Chapter 7** will describe the development of a caregiver questionnaire aimed at measuring moral emotions in preschoolers. **Chapters 6** and **7** will be essential for understanding and comparing differences in moral emotions and externalizing problems in DHH and hearing children which will be explored in **Chapter 8.** Finally, in **Chapter 9,** findings from the previous chapters will be synthesized and discussed. Practical implications and recommendations regarding social functioning and emotional development of DHH children will be presented at the end.

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Chapter 2

Play and emotions

The effect of physical play on children’s social well-being

Veiga, G., Da Silva, B.M.S., Rieffe, C., & Gibson, J. L. (2022). Play and emotions: The effect of physical play on children's social well-being. in D. Dukes, E. Walle, & A. C. Samson, The Oxford Handbook of Emotional Development. Oxford: Oxford University Press.

ABSTRACT

Play is an important context for children's emotional and social development. Most play research has been focused on pretend play; however, observational studies have shown that children spend a considerable amount of time engaged in physical play. Although it is thought to be important, little is known about the role of physical play in children's emotion socialization. Physical play can be categorized in two forms: exercise play and rough-and-tumble play. Both forms involve moderate to vigorous playful body activity, which is accompanied by physiological arousal. In addition, rough-and-tumble play often involves role taking, requiring children to accurately read their partners' emotional and intentional expressions, control their anger impulses, and cope with frustration. Recent research has shown that exercise play, especially when engaged with peers, is related to emotion understanding and emotion regulation; but this is less clear for rough-and-tumble play. Besides, physical play provides an important mechanism for peer interactions that is less dependent on verbal interactions, which is especially relevant for children with communication impairments, and hearing loss in particular.

INTRODUCTION

Children like to play. Play provides relaxation, evokes pleasure, induces a sense of freedom, and gives children the opportunity to refine their skills without fear of failure. Play begins very early in life and has been argued to be one of the leading sources of children's development by many developmental theorists (Montessori, 1989; Piaget, 1951; Vygotsky, 1967). Children will almost automatically start playing whenever and wherever they can, and they will play whatever they want to: sometimes children run and chase each other, or construct things, or pretend to be someone else. From a social perspective, we can see children playing alone, playing with caregivers, playing cooperatively in small or larger groups, and sometimes quietly observing others at play.

Although the observation of children playing uncovers significant variation in play behaviours (see Zaharia et al., 2022), many play theories and much research have focused on pretend play (Fein, 1981; Lillard et al., 2013). Yet, what can we observe when observing a playground after the morning classes? What do children do outdoors when the sun rises after a rainy week? How do children play when in a forest or at the beach? They run, jump, chase each other, and wrestle! They laugh and speak in ways that are as powerful and as dynamic as their movements. Indeed, observational studies have shown that children spend a considerable amount of time engaged in physical play—such as running, catching, or wrestling—especially when outdoors (Lindsey, 2014; Veiga, de Leng, et al., 2017).

Despite its significance in children's everyday lives, physical play has been relatively neglected by most developmentalists. A recent review found that while much research has been done linking physical play to physical health outcomes, there is little research on its importance in children's emotional socialization (Gibson et al., 2017). Historically, this may be due to the influence of mind–body dualism and the subsequent separation of movement and emotion in popular conceptualization and in academic research. However, as researchers have returned to investigations of the link between physicality and emotion there is an emerging body of work that connects the physical aspects of play with children's social and emotional well-being (Gibson et al., 2011; Heravi et al., 2018; Lindsey, 2014; Pellegrini & Smith, 1998; Veiga, de Leng, et al., 2017).

This chapter provides an introduction to how different types of physical play are related to emotional development in childhood. An introduction to the body and emotions, and, to the concept of physical play, is given before moving to a discussion of the links between physical play and social-emotional well-being. The chapter then explores, in depth, the case of rough-and-tumble play, which has been proposed as a key mechanism for childhood emotional and behavioural self-regulation. Finally, the chapter considers the importance of physical play for those children who face challenges due to disability, focusing in particular on children with hearing loss. The chapter concludes with suggestions for future research in this important area.

BODY AND EMOTIONS

An emotion starts with a meaningful situation that captures our attention and arouses the body. This leads to an appraisal—an evaluation of the eliciting event as pleasant or unpleasant and of the capacity to cope with the situation. Along with the appraisal comes an urge to respond—an action tendency, which results in the actual response—the communication of the reaction and the behavioural intention, which will modify the situation and restart the process (Frijda, 1986; Sander et al., 2005; Scherer, 2000).

Emotions are often experienced as (more or less) notable bodily sensations (e.g., rapid heartbeat when a big dog starts barking, tension in the abdominal zone on an examination day), reflecting changes in skeletomuscular, neuroendocrine, and autonomic nervous systems (Levenson, 2003) that prepare the individual to react quickly and adaptively in order to manage and regulate the intensity of the arousing experience. Young children need to learn to link those bodily cues to the emotion-evoking situation; for example, linking the sensation of tummy ache to anxiety about attending a new class. As children gradually come to understand that bodily sensations are part of the emotion process, they also learn to ignore them and focus on the emotion-evoking situation instead (Rie e et al., 2008). Yet, when asked to reflect upon their bodily sensations retrospectively, children and adults alike can point out that they feel tension in their muscles when angry, or tension in their stomach when nervous.

The "sense of the physiological condition of the body" (Craig, 2003), also called interoception, is therefore related to the experience of emotions (Barrett et al., 2004), facilitating their understanding and regulation (Füstös et al., 2012), both in adults (e.g., Barrett et al., 2004; Füstös et al., 2012) and in children (e.g., Koch & Pollatos, 2014; Schaan et al., 2019). In fact, from an early age (at least since preschool age) children are already able to consciously experience internal bodily sensations (Füstös et al., 2012), and such capacity to perceive one's own bodily sensations (e.g., heart beats) has been related to emotion-regulation skills (Schaan et al., 2019). The importance of interoception within emotional experience sheds light on the role of physical play on children's social-emotional well-being.

PHYSICAL PLAY

Defined as moderate to vigorous physical activity that takes place in a playful context, physical play involves large muscle activity and physiological arousal (e.g., racing heartbeat, rapid breathing, high muscle tone) (Pellegrini & Smith, 1998). This form of play can be categorized into two distinct subtypes: exercise play and rough-and-tumble play. Both forms of physical play represent a significant part of children's daily lives and play an important role on children's social-emotional well-being.

Exaggerated, active, and moderate to vigorous locomotor behaviours such as running, jumping, and climbing are labelled exercise play (Pellegrini & Smith, 1998). Exercise play begins in the first year of life, when children start mastering motor skills, and peaks around 4–5 years of age before declining in the primary school years (Pellegrini & Smith, 1998). Although exercise play has been historically considered a masculine play type, recent research has found no gender differences in this domain (Colwell & Lindsey, 2005; Lindsey & Colwell, 2013; Veiga, de Leng, et al., 2017). Exercise play accounts for 19–40% and 14–48% of preschool girls' and boys' peer play respectively (Colwell & Lindsey, 2005; Veiga, de Leng, et al., 2017).

When these active play behaviours involve suspending reality and relate to chasing, play fighting, and wrestling, we identify them as rough-and-tumble play (Bjorklund, 2009). This form of physical play has a strong social component, and often involves reversing roles (win and lose, catch and be caught) and suspending reality (e.g.,

playing monsters, pirates, wrestling) (Pellegrini, 2009). Research has found that boys engage more in rough-and-tumble play than girls (Colwell & Lindsey, 2005; Lindsey & Colwell, 2013; Veiga, de Leng, et al., 2017). This form of physical play increases during the preschool period, peaks around the age of 6–10 years, and declines in adolescence (Bjorklund, 2009). The frequency of rough-and-tumble play seems to be highly related to the characteristics of the environment. Rough-and-tumble is the most prevalent form of social play in the preschool outdoor playground, accounting for 34% and 62% of preschoolers' social playtime for girls and boys respectively (Veiga, de Leng, et al., 2017). However, when observed in indoor and more structured environments, these frequencies decline to 19% and 22% respectively (Lindsey, 2014).

PHYSICAL PLAY AND CHILDREN'S SOCIAL-EMOTIONAL WELL-BEING CHILDREN

Children are wired to move; to experience themselves and others in space and time in ways that do not have to involve words. In fact, when we observe toddlers and preschoolers playing in a park, we may see them throwing themselves to the ground, feeling their bodies in contact with the rocks, splashing their feet in puddles, and racing against each other. We hear them shouting and laughing with pleasure and joy. The large body movements in this scenario give children important sensory inputs, and stimulate their muscle and bone strength, advancing such motor skills as balance and coordination.

In early childhood, when language skills are still developing, motor competence is of particular importance for young children's engagement in peer interactions. Improved motor competence makes children more adept and attractive playmates (Pellegrini & Smith, 1998). On the contrary, poor motor competence may limit children's engagement with team physical games and interactions, and it is linked to a lower sense of physical and social competence, and increased experience of anxiety and depression (Cummins et al., 2005; Piek et al., 2008; Schoemaker & Kalverboer, 1994). Furthermore, physical activity modulates hormones, amino acids, and neurotransmitter levels (e.g., dopamine, serotonin, cortisol), stimulating positive mood states and producing a calming effect (Heijnen et al., 2016), which may support positive peer relationships. Hence, as a rich opportunity to improve motor competence and to promote positive mood states,

physical play seems to contribute to children's establishment of successful peer relationships (Pellegrini & Smith, 1998).

As described previously, the physiological arousal (e.g., racing heartbeat, rapid breathing, high muscle tone) present in physical play is an important component of the emotional experience. A girl happily running away from her friend can hear her heart beating quickly; a boy walking on a narrow high wall can feel the tension in his stomach and notice his shortness of breath. Through the opportunity to perceive bodily changes associated with emotional experience, physical play constitutes an important context for children to become aware of their own and others' emotions, and to learn how to regulate them (Smith, 2010). Recent research has shown that exercise play, especially when engaged in with peers, is related to emotion understanding, emotion regulation, and social competence (Lindsey & Colwell, 2013; Veiga, de Leng, et al., 2017), but this association is less clear for rough-and-tumble play.

THE CASE OF ROUGH-AND-TUMBLE PLAY

Consider the following short play observation:

John and Mike are two 6-year-old friends who are at the school playground. John is tall, strong, and the oldest of the class; Mike is the shortest.

John suggests to Mike, "Let's play the world wrestling championship!"

John starts moving his arms with combative, yet soft, owing movements.

The play fight continues with soft and balletic moves made by both children.

John slowly punches Mike, who passively falls to the ground.

John raises his arms shouting, "Yeah! I won the fight!"

John circles around the playground shouting, "I won the fight!"

John returns to Mike and tells him, "Let's go again!"

This time it is Mike who puts John on the ground, proudly winning.

They have a third bout and John “wins” again.

When their teacher calls them back to class, Mike and John are holding hands and run back to the classroom together.

This short observation illustrates two friends engaged in play fighting, alternating roles, cooperation, and competition. However, no “real” fighting occurred in this scenario and, therefore, it is an excellent example of rough-and-tumble play as a privileged arena for children to practice their emotional competence.

First, rough-and-tumble play requires children to understand their own and others’ emotions. As children enact vigorous, emotionally charged themes, excitement, pleasure, and sometimes frustration rise up, requiring children to be skilled at expressing their own emotions and intentions, as well as reading the affective and intentional cues from others about the play episode. Second, as children easily become aroused, they have to ne-tune their playful aggressive mode and modulate their excitement. In other words, during rough-and-tumble play interactions, children need to be skilled at regulating their intense emotions in order to sustain the vigour, excitement, and emotional intensity of this apparently violent form of play, instead of breaking down into aggression (Flanders et al., 2010; Pellegrini & Smith, 1998). This way, children learn their own and others’ personal limits and abilities, and understand how their behaviour affects others (Logue & Harvey, 2009). For instance, in the example observation, if John had hurt Mike, the play would have stopped, and John would learn that he had been too rough. This function of rough-and-tumble play as a form of emotional regulation may have its roots in early development, particularly in the context of father–child playful interactions. Rough-and-tumble play is considered a key context where fathers teach their children to regulate intense affect by intensifying the arousal of the rough interaction and subsequently decreasing it when it surpasses what children can tolerate (Paquette, 2004). For these reasons, rough-and-tumble play is argued to be the “traditional means by which most children learn to regulate physical aggression” (Tremblay, 2006, p. 485) and to foster children’s social-emotional well-being. However, research shows ambiguous findings.

On the one hand, research shows that rough-and-tumble play among peers is positively associated with preschool boys’ emotion-regulation skills, both concurrently and longitudinally (Lindsey & Colwell, 2013). Interestingly, such associations have not

been observed for girls. Rough-and-tumble play has also been found to be associated with school-aged children's and adolescents' social competence (Pellegrini, 1988, 1994). On the other hand, other studies have found that preschoolers' rough-and-tumble play at school recess is positively related to physical aggression (Veiga et al., 2020) and to negative indicators of social competence, such as being disliked by peers (Hart et al., 1992; Ladd & Price, 1987).

Such equivocal findings could suggest that the functions of rough-and-tumble play may change across children's development (Hart et al., 1992). It is possible that such play may be too demanding for preschoolers, given that the frequency of this form of physical play peaks at an older age (Pellegrini & Smith, 1998). This explanation would t with the extensive theoretical framework arguing that this form of play has the immediate function of practicing social-signalling skills (Bjorklund & Pellegrini, 2000). Furthermore, engaging in rough-and-tumble play requires children to accurately distinguish play from aggression, which might be extra demanding within an arousing atmosphere (Smith & Boulton, 1990). Therefore, regulating arousal during rough-and-tumble play might be especially challenging for a preschooler, who might misinterpret the situation, given that cooperative behaviours, theory of mind, and emotion-regulation capacities are only just emerging in children of this age group.

Carraro and colleagues (2014, 2018) developed a program based on rough-and-tumble play, assuming that exposing students to nonthreatening body-contact experiences within the school setting would help to reduce self-perceived aggression. School-aged children and young adolescents engaged in eight lessons, two times a week, over 1 month (Carraro & Gobbi, 2018; Carraro et al., 2014). The program entailed a progression in terms of physical contact and opposition. For example, initial games involved brief physical contact and touch between participants, while in the final lesson, participants engaged in play fighting in pairs, pushing, pulling, chasing in pairs, or trying to pull the partner to the ground. Both studies showed that the program effectively reduced school-aged children's and adolescents' self-reported aggression (Carraro & Gobbi, 2018; Carraro et al., 2014). A similar program carried out with institutionalized school-aged children was shown to decrease internalizing symptoms (Veiga et al., 2020).

While these studies reinforce the idea that rough-and-tumble play may be beneficial for older children's emotional competence, the fact that these programs were

carried out in a structured environment (i.e., in physical education classes, psychomotor therapy) also suggests that this form of physical play requires certain boundaries. For example, in the study that showed a positive relationship between rough-and-tumble play and preschoolers' physical aggression (Veiga, O'Connor, et al., 2020), there were only two adults supervising 100 children during recess, who had been instructed not to interfere in children's play, and to let them play freely and solve their own problems independently. Possibly, preschoolers needed a more controlled and calmer environment to take the best from rough-and-tumble play.

Research shows that qualitative aspects of father–child rough-and-tumble play, such as dominance and positive affective climate, support children's development in social and emotional domains. When we observe parent–child rough-and-tumble play interactions, we often see caregivers sensitive to their children's needs and emotional states, maintaining physical and emotional engagement and enabling a reciprocal exchange of dominance and subordination, with warm and positive affect. However, this is not always the case. Some caregivers find it difficult to contain and maintain the positive atmosphere of such intense body-play interactions, and highly aroused children come close to the point of losing control and becoming physically aggressive (Paquette, 2004). This can occur for different reasons: for example, due to overexcitement, difficulties in the caregiver's reading of their child's emotional expressions, or difficulties in managing their child's emotions. Some caregivers find it difficult to maintain arousal at an optimal level, making it more di cult for children to self-regulate.

Children need to learn to regulate their own emotions. This process takes place through emotion socialization, which is based on modelling, observing others, and talking about emotions with knowledgeable others. Therefore, if caregivers do not set limits during play, they may reduce opportunities for their children to learn "the social boundaries of their aggressive behaviour," and this may inhibit emotion-regulation skills (Flanders et al., 2009, p. 287). Moreover, if caregivers respond to their children's playful yet aggressive behaviours with harsh emotional expressions, they may be teaching them to respond reciprocally to others' negative affect; that is, to respond by increasing conflict, which may in turn negatively impact their social interactions (Carson & Parke, 1996). Two factors seem to be important for caregiver–child rough-and-tumble play.

First, the caregiver should set limits on play by regulating the child's aggressive impulses. Research shows that when caregivers do not set limits or show dominance, the child can become more, rather than less, hostile (Barth & Parke, 1993; Flanders et al., 2009, 2010). In fact, caregivers should "communicate a double message to his child: 'I love you' (affective component) and 'I am stronger than you' (agonistic component)" (Paquette, 2004, p. 208). Second, the emotional atmosphere should be positive, as the display of negative affect through the course of playful interaction has been associated with more physical aggression in children (Carson & Parke, 1996; Veiga, O'Connor, et al., 2020). Caregivers should be aware that rough-and-tumble play should always involve a "laugh play face"—a warm and playful expression that is distinctly different from one adopted during fighting or aggression (Humphreys & Smith, 1987).

THE IMPORTANCE OF PHYSICAL PLAY FOR CHILDREN WITH DISABILITIES: CHILDREN WITH HEARING LOSS

As physical play does not require complex receptive or expressive communication skills, ne motor skills, or sustained attention, almost every child can engage and succeed in physical play. Many children with disabilities enjoy, and often prefer physical play (Case–Smith & Kuhaneck, 2008). Physical play involves proprioceptive and vestibular stimulation, which can support children with challenges in these domains (e.g., autism, attention deficit hyperactivity disorder, sensory integration disorder) to organize their behaviour and feel calm (Baranek, 2002; Blanche & Schaaf, 2001). All these features make physical play an important context for social learning for children with disabilities.

These benefits of physical play may apply particularly to children with communication impairments, such as children with hearing loss, specific language impairments, or autism spectrum disorder. This group of children may have particular difficulties in engaging in play that involves higher levels of verbal communication (e.g., complex role play or pretense). The remainder of this chapter therefore explores how physical play could enhance social-emotional skills of children with communication impairment, using the example of children with hearing loss as an illustrative case study.

Like other children with communication impairments, children with hearing loss have reduced access to incidental learning (see Ketelaar et al., 2022). In their case, they

may struggle to learn from observing or overhearing their peers' emotions and/or social behaviours in naturalistic contexts (Calderon et al., 2003; Moog et al., 2011). For these children, it might be harder to "connect the dots" of communication (i.e., facial expression, gestures, tone of voice, eye contact and other nonsymbolic actions, verbal content), which might lead to misinterpretations of the emotional exchange that is taking place. For example, some facial expressions can be misunderstood when they are not connected to the tone of voice or to the verbal information. Incidental learning is crucial for children's emotional and social development, and research has consistently shown that young children with hearing loss find it more di cult to understand others' emotions, regulate their own emotions, and communicate emotions (Ketelaar et al., 2012; Netten et al., 2017; Wiefferink et al., 2013).

As stated previously, play is a privileged arena for children's overall development. However, engaging in play can be a serious challenge for children with hearing loss. During play, linguistic competence is important for maintaining social interactions. Yet, with the extensive auditory and kinetic stimulation, the rapid development of contacts and rules that occur during play, participation becomes even more di cult (Brown et al., 2008; Rieffe et al., 2016). Perhaps not surprisingly, children with hearing loss seem to be more successful in engaging in one-to-one peer situations than in interactions involving two or more hearing peers (Martin et al., 2010). Furthermore, although children with hearing loss position themselves optimally for participation in the group, some research indicates that they are less well tuned in (Brown et al., 2008).

Children with hearing loss, either in mainstream education (da Silva et al., 2020) or in a special class (Mira et al., 2019), show a higher prevalence of exercise play compared to their hearing peers. Although the image of children with hearing loss running and jumping in the playground apparently contradicts the old idea that these children have motor difficulties (Hartman et al., 2011; Savelsbergh et al., 1991), recent studies have shown that, despite their possible balance deficits, children with hearing loss show a similar level of motor competence as their hearing peers (Engel–Yeger & Weissman, 2009). In fact, Higginbotham and Baker (1981) suggest that one particular form of physical play—exercise play—could help children with hearing loss to organize and maintain their play. Possibly, as pretend play relies on complex and continuous verbal interactions, exercise play could o er a less verbal alternative for children with hearing loss to more easily hang out with their peers. Exercise play offers opportunity for them to

use their body and movement to communicate, cooperate, and share the joy of playing together. Moreover, exercise play is more perceptible than pretend play, therefore readily catching children's attention and signalling what they need to do to join the peer interaction.

Imagine in a large playground, a young girl with hearing loss wandering around, observing her peers playing, and wishing to join them. From afar, she sees a small group of children using some little toys and talking. Because of her auditory impairment she is not able to quickly figure out what her peers are doing, and what they are actually playing. Are they taking part in pretend play? Are they building something? She might not feel con dent enough to enter their interaction, and choose to avoid it. Next, she sees some peers throwing a ball at a wall, trying to see who can throw the highest and laughing when the ball goes away. This scenario catches her attention; she can easily understand what her peers are doing, and joins them. It seems plausible to assume that, considering the benefits of exercise play for children's emotion understanding and regulation that we have described here, this form of play, which is so readily available for joining in with, might be an important venue for the social-emotional well-being of children with hearing loss. Note that this scenario not only suits children with hearing loss, but also other children with communication impairments, for example children with a developmental language impairment. Although not all children with autism would like to join active group play, exercise play might be more easily accessible for them also, for the aforementioned reasons.

Regarding rough-and-tumble play, and based on our observations in the playground, children with communication impairments, and hearing loss in particular, are less likely to engage in play fights, preferring to chase and be chased (Vicente, 2019). Possibly, chasing gives these children with hearing loss an alternative rough interaction which only involves brief physical contact and opposition, and is therefore less demanding in terms of emotion understanding, emotion regulation, and theory of mind capacities. Nevertheless, more studies are needed to understand the importance of rough-and-tumble play for children with communication difficulties. For example, given the research showing that young children with communication impairments use less adaptive emotion-regulation strategies, it would be worthwhile to understand how caregivers of these children use rough-and-tumble play in caregiver–child interactions. Intervention research may lead to a better understanding of whether helping caregivers to be sensitive

in understanding and regulating their children's emotions, while in rough-and-tumble play, could have a positive effect on the social well-being of children with communication difficulties.

SUMMARY AND OUTLOOK

To summarize, this chapter has explored how physical play is an important, yet often neglected, component of how children learn to regulate their emotions. Physical play can be used to support social and emotional skills development both in the context of interactions between peers and of caregiver–child interactions. Finally, the relevance of physical play for providing a mechanism for peer interactions that is less dependent on verbal interactions for children with communication impairments and hearing loss was explored specifically.

Given the scarcity of research on this topic, there are plenty of gaps that could be addressed. One priority is to develop reliable measurement tools and analytical methods that could be used to test various theoretical propositions regarding physical play. Advances in this area have been made by increasing use of sensor technologies that can provide physiological, social, spatial, and temporal information (Heravi et al., 2018; Moreno et al., 2019; Veiga, Ketelaar, et al., 2017). Secondly, as most research to date has been carried out in Western contexts, and playful interactions and emotion appraisal/expression are known to vary by culture (e.g., Rao & Gibson, 2018), we recommend that more research be done across a range of countries and cultural contexts. Finally, given the promising data on physical play supporting inclusion, we hope that this chapter will inspire more research into how physical play interventions can support children with communication difficulties.

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Chapter 3

Being Deaf in Mainstream Schools

The effect of a hearing loss in children's playground behaviours

Da Silva, B.M.S., Rieffe, C., Frijns, J.H.M., Sousa, H., Monteiro, L., & Veiga, G. (2022). Being Deaf in Mainstream Schools: The effect of a hearing loss in children's playground behaviours. *Children*, 9, 1091. https://doi.org/10.3390/children9071091

ABSTRACT

Naturalistic playground observations are a rich source of information when studying the social interactions of preschool children. On the playground, children can interact with their peers, explore different places and activities, and engage in different types of play. For deaf and hard of hearing (DHH) children, interactions at a playground can be more difficult because of the large number of auditory stimuli surrounding them. Constraints in the access to the social world on the playground might hamper DHH children's interactions with their typically hearing (TH) peers, activities, and play. This pilot study aimed to examine the playground behaviours of preschool DHH children across three aspects: social levels, type of activities, and play choices. For this purpose, 12 preschool DHH children were observed during recess time, and their behaviours were coded and compared to their 85 TH peers. The preliminary findings indicate that DHH children spend less time in social interactions compared to their TH peers and that they still face difficulties when socially engaging with their TH peers. These findings suggest that interventions should focus on three aspects: the physical environment awareness of TH peers about communicating with DHH children, and the use of exercise play to facilitate social interactions between DHH children and their TH peers.

INTRODUCTION

A rich way to understand preschool aged children's skills and social interactions is through observing their play, and peer interactions on playgrounds. Through the observation of naturalistic interactions – without adult interference – one can understand each child's particular interest while playing, the dynamics between peers, their positioning in the social group, and their skills to enter and maintain interactions (Heravi et al., 2018; Veiga et al., 2016, 2017). However, playgrounds are often neglected as a mean to study children's development (Pellegrini & Bohn, 2005), and this kind of research is especially scarce regarding preschool Deaf and Hard of Hearing (DHH) children. Most research in this field dates from 20 to 40 years ago (see Antia et al., 2012, for a review), and reports that DHH children show different behaviours on playgrounds compared to their typically hearing (TH) peers, suggesting that the constraints in access to the social world affects their social interactions with peers (Antia et al., 2012). However, recently, many developments took place in terms of rehabilitation and technology (e.g., cochlear im-plants), and in terms of education. Currently, most DHH preschool children attend mainstream setting, which implies that they are mainly surrounded by TH peers (DeLuzio & Girolametto, 2011; Minnett et al., 1994; Stinson & Kluwin, 2012). In this pilot study, we focus on describing the playground behaviours of DHH preschool children on three categories: social levels, types of activities, and types of play.

School playgrounds usually offer many opportunities for children to engage in various forms of social behaviours, which have been related to higher levels of social competence, and lower levels of internalizing symptoms and peer problems (Coplan et al., 2014; Veiga et al., 2016). On playgrounds, children can play games (e.g., football, hide and seek), rest, communicate with peers, explore, and most importantly they can play. Play, defined as 'a spontaneous, pleasurable, and self-guided activity' provides children with a unique opportunity for their overall development (Pellegrini, 2009; Piaget, 1952). Yet, communication seems a key aspect for playing with peers (Levine & Antia, 1997; Quintas et al., 2009). Thus, children who have hindered communication – like DHH children – might face more challenges while playing. In fact, social play in itself, especially in the preschool years, is already difficult for these children to follow, as the interactions and rules keep changing, which might be more difficult for DHH children to follow (Rieffe et al., 2015). Moreover, social play can become even more difficult when

it occurs in the playground setting, with all the different auditory and kinetic stimuli (Veiga et al., 2022). In this chaotic setting, DHH children might miss out on information that is necessary to engage and maintain play with their peers, thus impacting their play choices (Antia et al., 2012; Bat-Chava et al., 2005).

While on the playground, children can broadly show three types of behaviours: non-social (i.e., solitary and reticent), parallel, and/or social (Coplan et al., 2014; Coplan & Ooi, 2014; Parten, 1933; Rubin et al., 1978). Social behaviours are those in which the child is communicating, and/or playing with their peers without any specific organization, or in a cooperative way (Antia & Dittillo, 1998; Parten, 1933; Rubin et al., 1978).

Nonsocial behaviours are those in which children do not try to initiate or engage in interactions with their peers, even though peers are available (Coplan & Ooi, 2014). Some children choose to play solitarily, however, the most frequent form of non-social behaviours are reticent (Hart et al., 2000; Nelson et al., 2008). Reticent behaviours can be split into onlooking behaviours, when children observe their peers without attempting to join them; or unoccupied behaviours, when children wander around the playground with no specific focus or purpose (Chen et al., 2006; Hart et al., 2000; Nelson et al., 2008). Although there is no consensus regarding the adaptive function of solitary behaviour, reticent behaviour has been related to less emotion understanding, internalizing symptoms, lack of social skills, and peer rejection (Choo et al., 2012; Coplan et al., 2008; Rubin, 1982; Veiga et al., 2017).

Parallel behaviours are those in which the child plays alone but is in close proximity with the peers, sometimes observing others and imitating them (Antia & Dittillo, 1998; Parten, 1933; Stinson & Antia, 1999). Parallel behaviours seem to mark the transition between non-social – solitary – behaviours and social – group – behaviours (Bakeman & Brownlee, 1980; Parten, 1933). That is, children are interested – and also learning – about their peers, including their play preferences, their interests, how they respond to situations and how they engage (Brown et al., 2008; Robinson et al., 2003). Therefore, parallel behaviours provide children with a unique opportunity to learn about their peers, and to understand how to initiate interactions with them and maintain them (Brown et al., 2008).

Access to their peers and joining in social play might be more challenging for DHH children. Studies show that DHH children are less successful in initiating and maintaining social interactions with their peers (DeLuzio & Girolametto, 2011; Levine & Antia, 1997; Weisel et al., 2005). DHH children thus spend more time alone at playgrounds compared to their TH peers (Guralnick et al., 2006), whilst showing more onlooking behaviours (Vandell & George, 1981). Moreover, when they interact, their interactions are shorter compared to their TH peers, which makes their social networks more fragile (PBrown et al., 2008; Wauters & Knoors, 2008). Note that their TH peers might form a barrier here, as DHH children are less often invited or allowed to join in play (DeLuzio & Girolametto, 2011; Guralnick et al., 2006; Levine & Antia, 1997) and TH peers are overall less willing to initiate interactions with DHH children (Weisel et al., 2005).

Regarding play, there are two major forms: physical and pretend play (Pellegrini, 2009; Pellegrini & Smith, 1998). Physical play can be characterized by a moderate to vigorous physical activity, that can be split into: exercise play (e.g., running, climbing), and rough-and-tumble play (e.g., chasing, play-fighting, etc.) (Pellegrini & Smith, 1998). Pretend play can be characterized by a symbolic – and playful – conversion of something into something else, that can be split into: role play (i.e., when an object is converted into something else), and fantasy play (i.e., impersonates someone else) (Fein, 1981; Lillard et al., 2013; Lindsey & Colwell, 2013). Research focused on play behaviours of DHH children show that DHH children seem to avoid pretend play (e.g., Brown et al., 2001; Brown et al., 2013; Levine & Antia, 1997). In fact, recent studies have shown that DHH children engage more in physical play, rather than pretend play (da Silva et al., 2021; Mira et al., 2019).

Using playground naturalistic observations, the aim of this pilot study is to describe spontaneous playground behaviours of DHH preschoolers integrated in mainstream education, and compare them to their TH peers. Within the umbrella of playground behaviours, we focus on social levels, type of activities, and type of play that these children engage in during recess time. Past studies looked into play choices, and social levels of preschool DHH children (see (Antia et al., 2012) for a review), however – to the best of our knowledge – no previous studies have also looked into the engagement in different types of activities. Focusing on these three aspects in a single study (i.e., social levels, type of activities, and play choices) allows us to get a more in-depth understanding

of how preschool DHH children behave on playgrounds. Regarding the social levels and based on previous research (Vandell & George, 1981), we expect that DHH children show more non-social behaviours, - in particular onlooking ones and less social behaviours – than their TH peers. Regarding the type of activities, due to lack of previous research, no assumptions are made. Regarding the play choices, based on previous research (da Silva et al., 2021; Mira et al., 2019) we expect that DHH children engage more frequently in physical play than any other type of play. These preliminary findings might provide a more comprehensive view on how hearing loss can influence social participation and play preferences of DHH children in mainstream education.

MATERIALS AND METHODS

Participants and Procedures

A total of 12 DHH children (Mage = 59.67 months, SD = 8.60 months; 58% boys), participated in this study. Six DHH children had profound loss and bilateral cochlear implants; four had severe loss and conventional hearing aids (HA); and two children had severe loss and HA in the left ear, and profound loss and CI on the right ear. All DHH children in our study used spoken language as their primary mode of communication. Similarly to previous studies (Nunes & Pretzlik, 2001; Wauters & Knoors, 2008), classmates of our DHH participants were recruited as control group. A total of 85 TH children (Mage = 61.98 months, SD =11.42 months; 45% boys). DHH children and their parents were recruited in two hospitals in Lisbon and asked to participate in this study during their hospital visit. DHH children's parents were asked for the name of the preschool that their child attended, and only when parents gave permission, the preschool was contacted at a later stage to participate. Preschools were first asked for their participation, and when they agreed, parents of all children in the group or class with the DHH child were also asked to participate. Participants were recruited in two hospitals in the area of Lisbon, and in preschools in the centre and south of Portugal. Parents, preschools, and hospitals were informed about the goals and procedures of the study, how data would be handled and stored to guarantee participants privacy, and about the voluntary nature of their participation. Parents gave written consent. Children were informed about the purpose of the study, and gave verbal consent on their own

participation. Approval for the study was obtained from the ethics committees of all institutions involved.

Materials

Playground Observations

A total of 548 videos were collected and randomly distributed between two trained observers. To test inter-observer reliability 24% of the videos were double-coded. Each child's behaviour at outdoor recess was randomly video recorded during 3 days. Each 3 minute video was split into 12 segments (15 seconds each), in which the observer identified the prevalent type of behaviour (social level; type of activity; type of play). A frequency score for each type of behaviour was obtained, through the division of the total number of segments in which the child was involved in each specific type of behaviour, by the segments in which the child was observed. If children were not seen during any segment, their behaviours were coded as "not observed".

Social level (k=.91) was coded based on social levels categories suggested by Rubin (et al., 1978), that is unoccupied, onlooking, solitary, parallel, social. A non-social category was obtained through the sum of unoccupied, onlooking, and solitary behaviours.

Type of activity (k=.88) was coded based on the different activities that children engaged in on the playground, that is play; games with rules; talking; exploratory behaviours; transitioning between activities; personal care; aggressive behaviours; and other behaviours. If children were not engaged in any activity, their behaviour was coded as reticent.

Play behaviours (k=.89) were coded according to the observation scheme developed by Veiga (et al., 2016). The prevalent type of play in which the child was engaging during each segment was coded (i.e., exercise play; rough-and-tumble; fantasy play, role play; constructive play; playing with the equipments; or other play).

STATISTICAL ANALYSES

First, descriptive data was gathered for both groups. Second group differences were assessed for each variable. Due to non-normality of the data, we used the Mann-Whitney U test to assess group differences. Third, within group differences were assessed through Friedman's rank test, and post hoc comparison between social levels, type of activities, and types of play of each group were accessed through pairwise Wilcoxon sum rank tests. Within group differences of social levels were assessed considering the 'non-social', 'parallel', and 'social' categories. While assessing in-group differences, the frequency of "Not observed" episodes was not considered for the analysis, as they do not represent behaviours.

RESULTS

As reported in Table 1, differences between groups appeared regarding the social levels of interaction at the playground during recess time. Compared to their TH peers, DHH children showed fewer social interactions ($U = 230.50$, $p = .002$), but more non-social behaviours ($U = 242$, $p = .003$). Within the domain of non-social behaviours DHH children showed more onlooking behaviours ($U = 265$, $p = .007$), and solitary behaviours ($U = 281$, $p = .012$), than their TH peers. Parallel interactions were almost absent for children in both groups.

Within group comparison of the level of social interactions showed no difference within the DHH group between social and non-social play ($Z = -1.26$, $p = .209$), whereas TH children engaged most in social play ($Z = -7.68$, $p < .001$). Furthermore, both groups engaged less in parallel interactions, in comparison to social (DHH: $Z = -3.06$, $p = .002$; TH: $Z = -7.85$, $p < .001$), and non-social interactions (DHH: $Z = -2.93$, $p = .003$; TH: -8.01, $p < .001$).

Table 1. Mean scores (SD), mean rank and results of Friedman's Rank Text for children's engagement in different social levels, activity, and types of play by group.

	DHH Group	**TH Group**
	Mean (SD)	**Mean (SD)**
Social Level		
Social**	.57 (.19)	.75 (.16)
Parallel	.00 (.01)	.01 (.03)
Nonsocial**	.42 (.18)	.24 (.16)
- *Unoccupied*	*.11 (.08)*	*.09 (.08)*
- *Onlooking***	*.11 (.07)*	*.06 (.07)*
- *Solitary**	*.20 (.15)*	*.09 (.09)*
Not Observed	.01 (.02)	.00 (.01)
	$\chi^2(2)= 18.67^1$ **	$\chi^2(2)= 152.83^1$ **
Activity		
Play	.44 (.17)	.42 (.19)
Games with rules	.02 (.05)	.08 (.15)
Communication	.23 (.17)	.28 (.17)
Exploratory Behavior	.02 (.04)	.03 (.06)
Transition	.02 (.02)	.02 (.03)
Personal Care	.02 (.04)	.01 (.02)
Aggressive Behavior	.00 (.01)	.00 (.01)
Other Activities	.02 (.03)	.01 (.02)
Reticent	.22 (.11)	.15 (.12)
Not Observed	.01 (.03)	.00 (.01)
	$\chi^2(8)= 77.40^2$**	$\chi^2(8)= 429.33^2$**
Type of Play		
Exercise*	.52 (.29)	.32 (.28)
Rough-and-Tumble	.13 (.18)	.15 (.22)
Fantasy Play	.02 (.06)	.12 (.22)
Role Play	.08 (.17)	.15 (.21)
Constructive Play	.05 (.14)	.06 (.15)
Equipment	.19 (.15)	.17 (.25)
Other	.01 (.03)	.03 (12)
	$\chi^2(6)= 31.71$**	$\chi^2(6)= 89.10$**

[1]Including the Nonsocial, Parallel, and Social categories; [2]Excluding the "Not Observed" category;

** $p < .05$; ** $p < .01$; *** $p < .001$;

No differences were found between groups regarding the engagement in different types of activities (Table 1). Within group comparisons of the type of activity (Table 2), showed that DHH children equally preferred to play, and communicate over the remaining activities, whereas TH children preferred play over all the remaining activities. For TH children, communication was the second preferred activity (Table 2). Furthermore, reticent behaviours were the third most prevalent activity for both groups (Table 2).

Table 2. Wilcoxon pairwise comparisons regarding types of activity DHH/TH children

	Play	**Games w. Rules**	**Communication**	**Exploratory**	**Transition**	**Personal C.**	**Aggressive**	**Other**
Games with rules	-3.06**/ -7.09***	-	-	-	-	-	-	-
Communication	-1.96/ -3.84***	-3.06**/ -5.87***	-	-	-	-	-	-
Exploratory	-3.06**/ -7.82***	-.51/ -1.65	-3.06**/ -7.90***	-	-	-	-	-
Transition	-3.06**/ -7.94***	-.87/ -1.93	-3.06**/ -7.77***	-.12/ -.59	-	-	-	-
Personal C.	-3.06**/ -7.91***	-.54/ -3.84***	-3.06**/ -7.93***	-.32/ -2.9**	-.92/ -3.86***	-	-	-
Aggressive	-3.06**/ -7.91***	-1.07/ -4.17***	-3.06**/ -7.96***	-.94/ -4.03***	-2.38*/ -4.48***	-.73/ -2.02*	-	-
Other	-3.06**/ -7.91***	0/ -3.71***	-3.06**/ -7.97***	-.42/ -3.08**	-.41/ -4.34***	-.32/ -.55	-1.84/ -.82	-
Reticent	-2.75**/ -6.81***	-3.06**/ -3.66***	-.55**/ -4.42***	-3.06**/ -6.79***	-3.06**/ -6.87***	-3.06**/ -7.43***	-3.06** / -7.62***	-3.06**/ -7.43***

* p < .05; ** p < .01; *** p < .001;

Regarding play, differences between groups were found for exercise play. Compared to their TH peers, DHH children engaged more in exercise play (U = 299, p = .026) (Table 1). Within group comparisons showed that both groups preferred exercise play over all the remaining types of play (Table 3). Furthermore, DHH children preferred to engage in constructive play with equipment rather than fantasy play (Z = -2.50, p = .012), whilst TH children preferred both forms of pretend play over constructive play (Table 3).

Table 3. Wilcoxon pairwise comparisons regarding types of play of DHH/TH children

	Exercise	**RTP**	**Fantasy**	**Role**	**Constructive**	**Equipment**
Rough-and Tumble	-2.67** / - 4.05***	-	-	-	-	-
Fantasy Play	-2.98** / -4.18***	1.68 / -.83	-	-	-	-
Role Play	-2.51* / -3.71***	-.98 / -.30	.85 / -1.31	-	-	-
Constructive	-2.75** / -5.58***	-1.26 / -2.77**	-1 / -2.03*	-.68 / -3.41**	-	-
Equipment	-2.35** / -3.42**	-1.25 / -.55	-2.50* / -1.15	-1.58 / -.19	-1.8 / -3.15**	-
Other	-2.98** / -6.56***	-1.72 / -4.51***	-.73 / -3.47**	-1.99*/ -4.75***	-.73 / -1.27	-2.81** / -4.32***

* p < .05; ** p < .01; *** p < .001;

DISCUSSION

The main purpose of our pilot study was to describe the spontaneous playground behaviours (i.e., social levels, type of activities, and play choices) of preschool DHH children who attend mainstream preschools, and compare them to their TH peers. As previously mentioned, past studies have focused on certain aspects of playground behaviours of preschool DHH children. However, these studies were mostly focused on children with conventional hearing aids, or who were implanted later, whereas neonatal hearing screening at national level, the development of new technologies, and early interventions now provide much better opportunities for DHH children to improve their hearing compared to 20 years ago (see Antia et al., 2012 for a review). Thus, understanding the differences – or similarities – between the current and past results might allow us to reflect on how the progress in the rehabilitation of DHH children has influenced their behaviours and abilities to participate within the peer group. Contrary to previous studies, the DHH children did not spend most of their recess time at the school's playground in non-social behaviours, but the prevalence of these non-social behaviours is still significantly higher than for their TH peers. Unfortunately, preliminary findings of the present study also suggest that DHH children still face difficulties in engaging in social interactions with their TH peers, and that they maintain similar patterns of interaction as found in studies from more than 2 decades ago (Antia et al., 2012).

In line with previous studies (Guralnick et al., 2006; Vandell & George, 1981) the DHH children in our study engaged less frequently in social interactions, and more frequently in non-social behaviours compared to their TH peers. Within the TH group, children preferred to engage in social interactions rather than non-social behaviours, however for DHH children this preference was not confirmed. DHH children seemed to be equally engaged in both types of behaviours (social versus non-social). Moreover, DHH children spent more time in onlooking behaviours, compared to their TH peers (Guralnick et al., 2006; Vandell & George, 1981). That is, DHH children spent time in proximity with their peers, observing them, without attempting to join them. These findings are often interpreted with regard to problems in the socio-emotional development of DHH preschoolers, such as a lack of emotion understanding (Wiefferink et al., 2013) and emotion regulation (Wiefferink et al., 2012), which may hinder them to freely participate in social interactions with their TH peers.

In our study all DHH children used spoken language as their primary mode of communication, similarly to their TH peers. To date, this is the case for most DHH children who have no additional diagnoses because most early intervention programs are focused on spoken language acquisition (NCHAM, 2019). Although technological advances in hearing devices allow DHH children to receive better auditory input, their hearing is still not comparable to that of their TH peers, and many factors can influence their communication in a predominantly TH world. Recent studies show that despite sharing the same communication mode, good language skills, compatible socioemotional functioning and good social skills, DHH children are still more often ignored or excluded by their DHH peers (Rieffe et al., 2018). Various factors may cause this lack of social inclusion. For example, poor acoustics of the play-ground might hinder full participation or any participation at all. Yet, this lack of social inclusion might also be partially caused by a lack of awareness in TH children to understand what it takes to include a DHH child in a noisy environment like playgrounds, in play. For example, the DHH child has to see where sounds are coming from; who is talking; and additionally, the face of the speaker should be facing the light. Furthermore, TH children should wait until one is finished talking, before starting to talk. In sum, TH children have to be aware that DHH children rely on visual cues to facilitate their access to social information. However, all these tasks are not easy for young children at playgrounds. Moreover, poor acoustics of the playground might further hinder full participation or any participation at all. But besides the access to sound, children can also easily exclude that one child who is perceived as "different", i.e., purposely ignoring or excluding a DHH child. All these facets might further contribute to difficulties for DHH children to develop their socio-emotional skills in ways that TH children do: in naturalistic, spontaneous settings with their peers.

In our study, the engagement of children from both groups in parallel play was almost absent. Although parallel play seems to play an important role in the transition from solitary play to social – group – play, previous studies have referred that this stage is not obligatory, and that they only arise if/when children need them to facilitate interactions, which might explain our results (Bakeman & Brownlee, 1980; Smith, 1978).

When on the playground, DHH and TH preschoolers show similar activities engagement: they spent most of their time playing, and communicating. Previous studies have suggested that because of their communication difficulties, DHH children might avoid communication with their peers in playground settings, which can also hinder their

engagement in play (see Antia et al., 2012, for a review). Our current findings suggest that the progresses in technology and rehabilitation might have positively contributed to their opportunities for communication in the mainstream setting. There are different types of hearing aids, but as a whole, all of these devices have been improved over the years. Furthermore, nowadays cochlear implants are a commonly used device for people who have severe to profound hearing loss, which allow them to have access to a wider range of auditory information compared to the conventional hearing aids (Rich et al., 2013). Also in our study, two thirds of the DHH children had CI's, which might explain the positive results regarding communication. When comparing a DHH child with a CI with a child with a conventional hearing aid, or no hearing aid at all, within the same range of hearing loss, the CI child will be able to access more auditory information, and therefore their communication abilities will be closer to TH children (Rich et al., 2013). In fact, after implantation, these children can achieve better communication skills, and therefore interact more and take more advantage of the auditory clues provided by the social environment (Bat-Chava et al., 2005), which might explain our results.

Regarding the engagement in play, our results are in line with recent literature (da Silva et al., 2021; Mira et al., 2019), that shows that DHH children prefer exercise play over any other type of play. Our hypothesis that DHH children would prefer physical play over pretend play was also confirmed. When comparing between the two types of play – physical and pretend – pretend play requires more complex language abilities, better communication and social skills (Casby & Mccormack, 1985; Mathieson & Banerjee, 2010). Therefore, our results are in line with previous studies, that shows that DHH children tend to avoid this type of play because it is more demanding in terms of language and socio-emotional skills (Brown & Watson, 2017; Casby & Mccormack, 1985). In comparison, exercise play might be less demanding in terms of language, and emotional skills, making it more attractive for DHH children (Veiga et al., 2022). Exercise play allows DHH children to use their bodies and movements (rather than words) to communicate, to be in synchrony, and to cooperate with their peers, promoting more frequent and more positive interactions (Veiga et al., 2022). Physical play, especially exercise play, has been suggested to provide DHH children with a more suitable alternative to engage in play with their peers (Veiga et al., 2022). Furthermore, contrary to their TH peers, DHH children preferred constructive play over pretend – fantasy – play. The reasoning for this preference seems to be in line with the pretend versus physical play

preference. Previous studies that compared the engagement of DHH preschool children in both types of play, showed that these children spend more time in constructive play rather than in pretend play (Higginbotham & Baker, 1981; Levine & Antia, 1997). Similarly, to physical play, constructive play is less dependent on verbal communication, in comparison to pretend play. Furthermore, constructive play does not require children to have a play partner, and can be easily engaged alone. Indeed, previous studies report that DHH children prefer to engage solitarily in constructive play, rather than engage in cooperative/social types of play (Higginbotham & Baker, 1981).

As a final note, we want to address four limitations that might be addressed in future studies. First, this is a pilot study with a small sample size. Future studies should replicate our study with a larger sample, to confirm if our results are maintained with a more representative sample of the population. Furthermore, a larger sample size would allow comparisons between DHH children who use conventional hearing aids versus cochlear implants. Comparisons between both types of hearing devices can further inform us about the benefits types of different hearing devices, and how each device singularly impacts social participation and inclusions of DHH children within the peer group. Second, in the present study all participating DHH children were in different classes or schools, and consequently, only had TH peers available for them at school. DHH children in main-stream schools, still prefer to engage in interactions with similar peers (Stinson & Kluwin, 2012), which might have influenced the high prevalence of non-social behaviours. It will be worthwhile that future studies focus schools where DHH child have other DHH children, as well as TH peers. The presence of DHH peers on the playground, might allow these children to feel more welcomed into engaging in group interactions with other DHH children. Third, all the DHH children in our study used spoken language as their primary mode of communication. However, this is not true for all DHH children mainly because spoken language is not accessible to them (e.g., they have irreversible deafness; they do not have criteria to benefit from hearing devices), or because they rely on a more visual – or bilingual - mode of communication (e.g., sign supported language) [48]. DHH children who do not use spoken language, might have a different social experience – and engagement – than the DHH children included in our study. Therefore, future studies could also include DHH children who primarily use sign language, or sign supported language, to understand how different communication modes influence social participation of DHH children within the peer group. Fourth, it is important to highlight

the importance of naturalistic observations, as a method to obtain information regarding children's interactions. Observations allow us to specifically understand what children are doing, and with whom, during the period of observation. However, this method is very time consuming, and it only allows us to capture limited fragments of children' interactions. New studies including new methodologies – such as sensor data – are also important to study playground behaviours, as they enable to capture spontaneous behaviour through intense and continuous data (Veiga et al., 2016, 2017). Future studies should combine observation data with these new technologies to better understand the social functioning of preschool DHH children on playground settings. Additionally, future studies should also include sociometric measures (e.g., likeability, friendship ratings, popularity), as these peer reports can further inform us about the social participation, and social positioning of DHH children within the peer group.

CONCLUSIONS

The outcomes of our study provide a current – and extensive – picture of the playground behaviours of DHH children. Our results might increase awareness to the positive impact that progress in technology, rehabilitation and educational policies have brought to these children. DHH children currently seem more prone to interact and communicate with their TH peers than DHH children 20 to 40 years ago. However, certain playground behaviours (i.e., high prevalence of onlooking behaviours; avoidance of pretend play) reflect that they still face some of the same difficulties in terms of socio-emotional development. This suggests that problems in interactions, are not solely related to DHH children hearing capacity, but are a consequence of multiple factors, such as the context in which interactions occur, the type of peers available, and the sensitivity/awareness of TH peers towards the DHH child. In this sense, environmental changes (e.g., changes in the playground setting), should accompany the progress of technology in providing these children better hearing, as to increase their social participation. Nowadays, most DHH children are integrated in mainstream education, interventions in this setting are needed to promote closeness, and positive social interactions with their TH peers. Interventions should increase the awareness of TH children on what is needed to communicate with a DHH child (i.e., the child has to see your face for example, in order to also use lip reading, or to see where the sound is coming from), promoting more, and better quality of

interactions. Furthermore, exercise play seems a promising tool to promote interactions between TH and DHH children, therefore interventions through play within the peer group (e.g., psychomotor therapy) can play an important role on DHH children's inclusion. Future research should address the impact of exercise play in the social inclusion of DHH children.

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Chapter 4

Empathy in preschool Portuguese children

Validation of the Empathy Questionnaire (EmQue)

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ABSTRACT

Empathy is an important building block for social inter-actions, that not only allows individuals experience and understand others' affective states, but also to help-fully respond to them. Although empathy can already be observed from infancy, only one questionnaire has been specifically developed to examine young children's empathy. This study translated and validated the original Dutch Empathy Questionnaire (EmQue) into Portuguese. A total of 250 caregivers of preschool typically developed children aged between 3 and 6 years old, participated in this study. To assess the validation, a confirmatory factor analysis (CFA) was conducted, and internal consistency and concurrent validity were tested. The outcomes confirmed that the Portuguese version of the EmQue is also organized in a three-factor structure (i.e., Emotion Contagion, Attention to Others' Feelings, and Prosocial Actions). The validation required the exclusion of five of the original items. The internal consistencies of the three EmQue scales for this Portuguese version were good. Associations between the three empathy scales with emotion recognition and prosocial behaviours were in accordance with previous research confirming concurrent validity. Divergent validity assessed through the association of the three empathy scales with aggression was partially confirmed.

INTRODUCTION

Empathy is an important building block for social interaction, allowing individuals to experience, understand and respond to others' affective states, and prompting people to help and to not harm each other (Decety, 2010; Decety et al., 2016; Hoffman, 1987; Mehrabian & Epstein, 1972; Rieffe et al., 2010). This so called "social-glue of human relationships," seems to be innate in mammal species, and can be observed and assessed from birth onwards (De Waal,2012; Decety, 2010; Hoffman, 1987). However, to date and to the best of our knowledge, only one questionnaire has been specifically developed to examine young children's empathy, identifying the different components of which empathy consists (Rieffe et al., 2010).

The Empathy Questionnaire (EmQue) is a parent-report questionnaire that was designed to observe three facets of empathy in young children's behaviours: Emotion Contagion, Attention to Others' Feelings, and Prosocial Actions (EmQue; Rieffe et al., 2010). The first facet, Emotion Contagion, also referred to as affective empathy, is already present in the first year of life, and involves the automatic imitation and synchronization with the emotional manifestation of another person's emotional state (Decety, 2010; Hatfield et al., 1993; Hoffman, 1987; Rieffe et al., 2010). For example, babies tend to start crying after hearing another baby cry, indicating that the ability to perceive and respond to others' emotional manifestations is already present in really young children (Dondi et al., 1999). At this early age, however, children are not yet aware that their distress is caused by another child's distress, and therefore they react as if the distress caused by others is their own (Decety, 2010; Vreeke & van der Mark, 2003). Emotion contagion has been related to more prosocial actions and less anger and aggression in preschool children (see Lovett & Sheffield, 2007, for a review).

Attention to Others' Feelings starts to develop when children gain more awareness and understanding of others' emotions (Davidov et al., 2013; Rieffe et al., 2010). They progressively start to gain this awareness, which is enhanced by their increasing abilities to self-regulate their emotional arousal (Decety, 2010; Hoffman, 1987; Netten et al., 2015). Thus, children need to be able to regulate their emotions, so they can learn to differentiate between arousal caused bythe distress of others and their own (Decety & Meyer, 2008; Rieffe et al., 2010). Attention to others' feelings becomes visible after 1 year of life, when children direct their attention towards others' emotional manifestations,

while showing less personal distress (Hoffman, 1987; Rieffe et al., 2010). Previous studies have shown that paying attention toothers' feelings allows children to develop more prosocial behaviours (Decety et al., 2016; Vaish et al., 2009; Williams et al., 2014). Furthermore, studies with clinical groups suggest that a lack of attention to others' feelings is related to difficulties in emotion recognition (Netten et al., 2015).

Prosocial Actions develop alongside the two other aspects of empathy, because only when children are able to regulate their emotions, and differentiate between personal distress and others' distress, they become capable of showing interest and concern for others' emotions (Eisenberg et al., 1996; Hoffman, 1987; Knafo et al., 2008; Zahn-Waxler et al., 1992). At this stage, which is already visible at 12 months of age, children become intrinsically motivated to act prosocially with the aim to reduce the other person's distress, by offering help, comfort, or support (Davidov et al.,2013; Decety, 2010; Decety et al., 2016; Hoffman, 1987; Williams et al., 2014; Zahn-Waxler et al., 1992). A high manifestation of prosocial actions is related to better peer acceptance and positive social interactions, and overall adaptive social–emotional functioning (Bandstra et al., 2011; Caputi et al., 2012; Eisenberg et al., 1999). On the contrary, a low prevalence of prosocial actions may lead to aggressive behaviours and peer rejection (Wardle et al., 2011).

The original EmQue was designed in Dutch, showing good psychometric properties, that is, a good three-factor structure and acceptable to good internal consistencies. Besides, the EmQue also shows a good concurrent validity, that is, the different EmQue scales are related to emotion understanding, emotion regulation, other's emotion recognition, and prosocial behaviour (Rieffe et al., 2010). To date, the EmQue has been translated into different languages (i.e., Dutch, Italian, Spanish, Lithuanian, and Japanese), validated by researchers from several countries and regions (i.e., North Europe, South Europe, and East Asia) (Grazzani et al., 2016; Lazdauskas & Nasvytien, 2020; Lucas-Molina et al., 2018; Rieffe et al., 2010; Takamatsu et al., 2021). Although some items were deleted in different languages or cultures, all studies confirmed the same three-factor structure on toddlers (Grazzani et al., 2016), preschoolers (Lucas-Molina et al., 2018), or both (Lazdauskas & Nasvytien ˙e, 2020; Rieffe et al., 2010; Takamatsu et al., 2021). In addition, a three-factor structure of empathy is also found in studies with older children (Bensalah et al., 2016), adolescents (Overgaauw et al., 2017), and adults (Carré et al., 2013). Therefore, validation of the EmQue with the Portuguese sample might

further contribute to our understanding about particularities, and similarities, of empathy development and experience across cultures.

PRESENT STUDY

The aim of this study was to examine the psychometric properties of the Portuguese version of the EmQue, including its factor structure, internal consistency, and the concurrent and divergent validity. For this purpose, a four-step approach was followed: (1) confirmation of the three-factor structure of the original Dutch EmQue; (2) analysis of the internal consistency of the three EmQue scales: Emotion Contagion, Attention to Others' Feelings, and Prosocial Actions; (3) concurrent validity through the association of the EmQue scales with emotion recognition, and prosocial actions measures; (4) divergent validity through the association of the EmQue scales with aggression. Given the sup-porting evidence of a three-factor structure model across other different languages, the three-factor structure of the original Dutch version was also expected for the Portuguese sample (Grazzani et al., 2016; Lazdauskas & Nasvytien ˙e,2020; Lucas-Molina et al., 2018; Rieffe et al., 2010). Nevertheless, in the previous validated versions (Grazzani et al.,2016; Lazdauskas & Nasvytien, 2020; Lucas-Molina et al., 2018; Takamatsu et al., 2021), the items included within each scale varied from the original Dutch model (Rieffe et al., 2010). Cultural differences and age group differences have been appointed as the main reasons for the differences in item selection (Grazzani et al., 2016; Takamatsu et al.,2021). Therefore, possible changes in the Portuguese version were also expected.

Concerning concurrent validity, in line with previous studies, the EmQue scale Attention to Others' Feelings was expected to be positively related to emotion recognition (Netten et al., 2015; Rieffe et al., 2010); and the EmQue scale Prosocial Actions was expected to be positively associated with emotion recognition (Rieffe et al., 2010). Besides, all three EmQue scales were expected to be positively related to prosocial behaviours (Bandstra et al., 2011; Eisenberg et al., 2006; Strayer & Roberts, 2004; Vaish et al., 2009; Williams et al., 2014). Regarding divergent validity, the EmQue scale Emotion Contagion was expected to be negatively related to aggression (Lovett &

Sheffield, 2007); and the EmQue scale Prosocial Actions were expected to be negatively related to aggression (Wardle et al., 2011).

METHODS

Participants and procedure

This study included the participation of 250 caregivers of Portuguese children (137 boys, 113 girls) aged between 3 and 6 years old (M = 62.03 months, SD = 9.01). The demographics of the participants are reported in Table 1. Socioeconomic status was assessed by the level of income of the parents. According to the latest data from the Portuguese Institute of Statistics, our sample socioeconomic status was in line with the general Portuguese population (INE, 2021). There were no significant differences for age and socioeconomic status between boys and girls. Children with special needs did not participate in this study.

Table 1. Demographic characteristics of participants

	Total (n = 250)	Boys (n = 137)	Girls (n = 113)
Age, mean (SD), month	62.03 (9.01)	61.19 (9.39)	63.04 (8.46)
Age, range, month	41 – 82	41 – 82	42 – 77
Socioeconomic status			
Maternal job, mean (SD)*	2.23 (.86)	2.25 (.83)	2.21 (.90)
Paternal job, mean (SD)	2.03 (.87)	2.02 (.87)	2.05 (.86)

*1= low income, 2 = average income, 3 = high income.

The participants were recruited directly through preschools in the area of Lisbon and south of Portugal. In total, 10 preschools (six private and four public) participated in this study. Preschools were first contacted about the purpose and planning of the study. After the preschools confirmed their willingness to participate, they informed caregivers about the study. Both caregivers and preschools were explained about the goals and procedures of the study, how data would be handled and stored to guarantee privacy, and

about the voluntary nature of their participation by the investigator. Caregivers gave their written consent and children gave their verbal informed consent before testing. Approval for the study was obtained from the ethical committee of the University of Évora and University of Lisbon, as well as from the Portuguese Commission of Data Protection and Portuguese Ministry of Education. The collected data were fully encrypted to ensure the privacy of the participants.

All the participating caregivers filled out two questionnaires (EmQue and the Strengths and Difficulties Questionnaires, SDQ). One additional questionnaire (Aggressive Behaviors Questionnaire) was filled out by 170 caregivers. The difference in sample size occurred because this questionnaire was not applied at an initial stage of the data collection. Furthermore, 191 children performed tasks, which measured their emotion recognition. The difference in sample size occurred because some children were absent on the day of data collection at their preschool.

With the exception of the SDQ, which was already translated to Portuguese, all measures used in this study were available in Dutch and/or in English. The Dutch or English versions of the instruments were translated into Portuguese using the back-translation method, performed by bilingual translators. The back-translated versions were compared and checked for language consistency with the original versions.

Measures

Empathy was measured by the EmQue (Rieffe et al., 2010). This 20-item caregiver-report questionnaire is comprised by 20 items representing three scales that measure empathy (see Table 2): Emotion Contagion (eight items), Attention to Others' Feelings (seven items), and Prosocial Actions (six items). Caregivers were asked to rate the prevalence of each described behaviour in their child, over the past 2 months in a 5-point scale (1 = (almost) never, 2 = rarely,3 = sometimes, 4 = very often, 5 = (almost) always. Higher scores correspond to higher levels of empathy.

Emotion recognition was assessed through eight emotion-attribution tasks (Veiga et al., 2017; Wiefferink et al.,2013) in which the child had to identify how a character felt in prototypical emotion-evoking vignettes (two per basic emotion: happiness, anger, sadness, and fear). Children were tested individually by a researcher, in a quiet room of the preschool. The answer was considered correct when the child named an emotion in

the intended valence (1 = incorrect valence, 2 = correct valence), either negative (anger, sadness, fear, or undifferentiated negative), or positive (happiness or positive in general). Higher scores correspond to better emotion recognition. This scale showed acceptable reliability (α = .61) (see Table 3).

Table 2. Items of the Empathy Questionnaire, EmQue (Rieffe et al., 2010)

Emotion Contagion	
1	When another child cries, my child gets upset too
4	My child also needs to be comforted when another child is in pain
7	When another child makes a bad fall, shortly after my child pretends to fall too
10	When another child is upset, my child needs to be comforted too
13	When another child gets frightened, my child freezes or starts to cry
16	When other children argue, my child gets upset
19	When another child cries, my child looks away
Attention to others' feelings	
3	When my child sees other children laughing, he/she starts laughing too
6	When an adult gets angry with another child, my child watches attentively
9	My child looks up when another child laughs
12	When adults laugh, my child tries to get near them
15	My child looks up when another child cries
18	When another child is angry, my child stops his own play to watch
20	When other children quarrel, my child wants to see what is going on
Prosocial Actions	
2	When I make clear that I want some peace and quiet, my child tries not to bother me
5	When another child starts to cry, my child tries to comfort him/her
8	When another child gets upset, my child tries to cheer him/her up
11	When I make clear that I want to do something by myself (e.g. read), my child leaves me alone for a while
14	When two children are quarrelling, my child tries to stop them
17	When another child gets frightened, my child tries to help him/her

Prosocial behaviour was obtained through the 5-item prosocial behaviour scale of the Portuguese version of the SDQ (Goodman, 1997). Caregivers were asked to rate children's prosocial behaviours in the last 2 months (e.g., "Helpful if someone is hurt, upset or feeling ill," "Kind to younger children."), on a 3-point scale (1 = not true, 2 = somewhat true,3 = certainly true). Higher scores correspond to a higher prevalence of prosocial behaviour. This scale showed accept-able reliability (α = .66) (see Table 3).

Aggression was measured through the Aggressive Behaviors Questionnaire (Dodge & Coie, 1987; Veiga et al., 2017), which comprises reactive aggression (three items; e.g., "Reacts aggressively after being teased," "Blames other children for the fights") and proactive aggression (three items; e.g., "Threatens or hits other children," "Makes other children turn against one child") items. Caregivers were asked to rate the prevalence of each described behaviour over the past2 months, in a 5-point scale (1 = (almost) never, 2 = rarely, 3 = sometimes, 4 = very often, 5 = (almost) always). Higher scores correspond to higher levels of aggression. The questionnaire showed a good reliability (α = .76) (see Table 3).

STATISTICAL ANALYSES

Firstly, and prior to conducting our analyses, the previous validated versions (Grazzani et al., 2016; Lazdauskas &Nasvytien ˙e, 2020; Lucas-Molina et al., 2018; Rieffe et al., 2010; Takamatsu et al., 2021) were tested in our sample.

None of the models showed an acceptable fit (see supplemental S.4.1 in Appendices). Therefore, we designated the original Dutch version as our baseline model, and proceeded with a confirmatory factor analysis (CFA) to find a model suitable for the Portuguese sample. Due to non-normality of the data and the categorical nature of the EmQue data, the weighted least-squares means and variance adjusted (WLSMV) estimation was used (Brown, 2006). Several model fit indices were used to examine the goodness of fit of the model. For this purpose, we used the $\chi 2/df < 3.0$ (Bollen,1989), the Comparative Fit Index (CFI) > .90 (Bollen, 1989), the Tucker–Lewis Index (TLI) ≥ .90 (Bentler & Bonett,1980; Lucas-Molina et al., 2018), and the Root-Mean-Square Error of Approximation (RMSEA) < .08 (Hu & Bentler,1999). Interfactor correlations were also computed to demonstrate diversity between the scales. Secondly, in order to assess whether age was related to the EmQue scales, we conducted Pearsons' correlations. As

significant correlations were found for age with the scales Attention to Others' Feelings (negative; $r = -.13$; $p < .05$) and Prosocial Actions (positive; $r = .13$; $p < .05$), partial correlations corrected for age were also performed. Thirdly, we assessed the internal consistencies and interitem correlations of the scales using Cronbach's alpha. Fourth, concurrent validity was examined through the associations between the EmQue scales and the Emotion recognition tasks, and the Prosocial behaviours scale of the SDQ. Lastly, divergent validity was examined through the associations between the EmQue scales and the Aggressive Behaviors Questionnaire

Table 3. Descriptives and internal consistencies of the EmQue scales, Emotion Recognition, Prosocial Behavior, and Aggression

	No. items	No. participants							Mean (SD)	Cronbach's Alpha	Inter-item correlation
		Total	By age				By gender				
			3yo	4yo	5yo	6yo	masculine	feminine			
EmQue											
Emotion Contagion (1-5)	5	249	16	76	119	38	136	113	2.42 (.71)	.76	.39
Attention to Others' feelings (1-5)	5	249	16	76	119	38	136	113	3.43 (.73)	.81	.25
Prosocial Actions (1-5)	4	249	16	76	119	38	136	113	3.10 (.79)	.82	.54
Emotion recognition (1-2)	8	191	6	65	90	30	105	86	1.96 (.11)	.61	.16
Prosocial behaviour (1-3)	5	246	14	75	119	38	136	110	2.58 (.35)	.66	.29
Aggression (1-5)	6	170	16	71	70	13	100	70	1.89(.57)	.76	.35

RESULTS

The CFA with the original 20-item model of the EmQue indicated a poor fit (Table 4). To improve the model, items with factor loading below .40 were considered for deletion one by one, whereby the content of the item was considered in the context of the intended factor. Following this step-wise procedure, items 19, 2, 11, 7, and 3 were excluded sequentially, resulting in Model 2 with a total of 15 remaining items (Figure 1). Model 2 showed a robust goodness of fit, with all the fit indices values reaching the desired cut-off points ($\chi 2/df = 1.649$; RMSEA = .054; CFI = .921; TLI = .904). In this final model, the Emotion Contagion scale was comprised by five items, the Attention to Others' Feelings scale was comprised by six items, and the Prosocial Actions scale was comprised by four items. The internal consistencies and interitem correlation coefficients for the three EmQue scales are reported in Table 3. All three scales showed good psychometric properties after item deletion. Cronbach's α of the Portuguese version of the EmQue (.79 for emotional contagion; .81 for Attention to Others' Feelings; and .82 for Prosocial Actions) was within the same range as the previous validated versions in Dutch (αs = .58–.80; Rieffe et al., 2010), Italian (αs = .73–.80; Grazzani et al., 2016), Spanish(αs = .60–.83; Lucas-Molina et al., 2018), Lithuanian (αs = .70–.83; Lazdauskas & Nasvytien ˙e, 2020), and Japanese (αs = .74–.84; Takamatsu et al., 2021).

Table 4. Results of the confirmatory factor analysis

	$\chi 2/df$	RMSEA	CFI	TLI
Model 1 (Original 20-item model)	1.864	.063 [.052, .073]	.824	.800
Model 2 (15-item model)	1.649	.054 [.037, .069]	.921	.904

The correlations between the EmQue scales Emotion Contagion × Attention to Others' Feelings ($r = .38$; $p < .01$); Emotion Contagion × Prosocial Actions ($r = .42$; $p < .01$); and Attention to Others' Feelings × Prosocial Actions ($r = .41$; $p < .01$) showed that the scales were positively related to each other, although not to a level that suggests collinearity. Regarding concurrent validity, the EmQue scales Attention to Others' Feelings and Prosocial Actions were positively related to Emotion recognition. All the three EmQue scales were positively

related to prosocial behaviours (Table 5). Concerning divergent validity, only the Prosocial Actions scale was negatively related to aggression (Table 5).

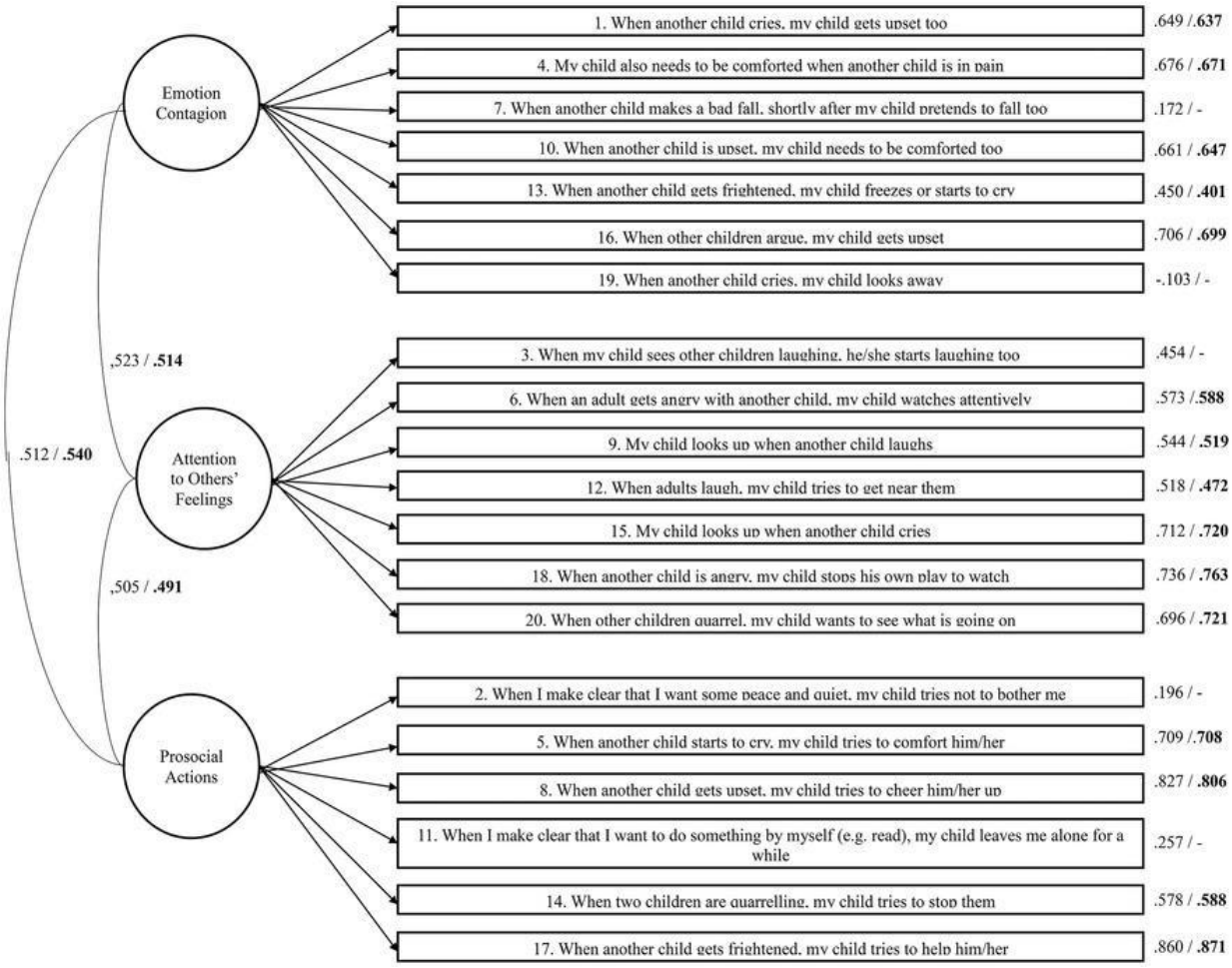

Figure 1. CFA of the three-factor structure of the EmQue (Original / **Portuguese Mode**

Table 5. Correlations of the EmQue scales with indices for Emotion Recognition, Prosocial Behaviors and Aggression corrected for age

	Emotion recognition (n = 190)	Prosocial behaviour (n = 245)	Aggression (n = 170)
EmQue - Contagion	.112	.324**	.094
EmQue - Attention to others' feelings	.274**	.241**	.061
EmQue – Prosocial Actions	.263**	.495**	-.181*

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

DISCUSSION

The outcomes of the psychometric properties of the EmQue translation into Portuguese showed that after removing five items, a solid 15-item scale (i.e., Emotion Contagion, Attention to Others' Feelings, and Prosocial Actions). The internal consistencies of the three EmQue scales for this Portuguese version were good.

In line with the original questionnaire (Rieffe et al., 2010), the Portuguese version of the EmQue is also organized in a three-factor structure. However, due to empirical–numerical reasons, the Portuguese version required excluding five items. Considering that all previous validated versions showed a reduction of items from the original Dutch model, item reduction was also expected for this Portuguese version. Similarly, to the original Dutch model, and all the previous versions, item 19 was excluded. Contrary to the other items in the EmQue, this item does not reflect an empathic behaviour, which might explain the low factor loading. Compared with the previous validations (Grazzani et al., 2016; Lucas-Molina et al., 2018; Rieffe et al., 2010; Takamatsu et al., 2021), our participants were relatively old, which might explain the low factor loading of items 3 and item 7. Although the youngest children in our sample were 3 years of age, the mean age of our participants was 5 years old (M = 62.03 months, SD = 9.01; range: 41–82 months) (Table 1).The two excluded items (3 and 7) describe an automatic imitation and synchronization with the emotional manifestation of someone else, which is observed in younger children, but is usually not appropriate for older preschoolers (Decety et al., 2016; Hatfield et al., 1993; Hoffman, 1987; Rieffe et al., 2010). Preschoolers, especially the older ones, are already aware that their distress is caused by someone else's

distress, and therefore tend not to be as contagious toothers' emotions, as younger children (Decety, 2010; Hoffman, 1987; Netten et al., 2015). Furthermore, two items (i.e., items 2 and 11) that focused on the parents not being disturbed, were removed from the prosocial action scale. The low factor loading of these two items might be related to different parenting styles of Portuguese parents, compared with the Dutch parents who were included in the original validation. North European parents (e.g., Dutch parents) are generally reported to be more distant and value their children's autonomy, compared with South European parents (Nunes et al., 2014). This rationale is in line with the Italian (Grazzani et al., 2016) and Spanish (Lucas-Molina et al.,2018) validations of this questionnaire, in which these two parenting-related items were also excluded. Relationships were found between age and the scales Attention to Others' Feelings (negative) and Prosocial Actions (positive). The negative relation between age and Attention to Others' Feelings might be related to the relatively older age of our participants. In terms of development, attention to others' feelings usually becomes visible after 1 year of life (Hoffman,1987; Rieffe et al., 2010), whereby children pause their own play or activity, to observe the distressed person. The items used in the EmQue scale Attention to Others' Feelings reflect these observational behaviours, suited for toddlers and young preschoolers. However, in older preschoolers, as was the case in our study, prosocial actions are more com-mon. Rather than just observing, older children more often want to comfort and thus approach the distressed person (Decety et al., 2016).

The concurrent validity of the three scales of the EmQue was also good and in line with previous studies. Emotion Contagion, Attention to Others' Feelings, and Prosocial Actions were related to more frequent prosocial behaviours (Eisenberg et al., 2006; Strayer & Roberts, 2004; Vaish et al., 2009; Williams et al., 2014). The ability to pay attention to others' feelings was related to a better emotion recognition (Netten et al., 2015; Rieffe et al., 2010). Furthermore, prosocial actions were related to better emotion recognition (Rieffe et al., 2010). Concerning divergent validity, the relations partially confirmed our hypotheses. As expected, prosocial actions were related to less aggression (Wardle et al., 2011), however, no relation was found between emotion contagion and aggression.

The lack of a relationship between emotion contagion and aggression was unexpected. Although the review paper by Lovett and Sheffield (2007) showed less aggression in adolescents who score higher on contagion (affective empathy), based on which we made the hypothesis on this relationship, it should be noted that this relationship was mainly examined

among adolescents and remained unclear in younger children. During the toddlerhood and preschool years, the skill for emotion regulation improves (see Waxman et al., 2014, for a review on inhibitory control). Yet, this development might initially be bound to social rules posed on children concerning their observable behaviours, such as not hit-ting others. Therefore, the internal locus of control might be less well developed. at the preschool age, compared with the control of external behaviours. Given that Emotion Contagion involves children's control over their internal level of arousal when observing a distressed other, it is possibly more related to an internalized dysregulation rather than to aggression, while in this study, only the latter was measured. Future studies could further investigate this assumption and examine the extent to which internalizing, dysregulated emotions might be related to levels of contagion and aggression at different ages.

We also want to note three limitations of this study that might be addressed in future studies. Firstly, parents were our only informants regarding their children's manifestations of empathic behaviours. This implies that only observable aspects of empathy were reported, which may not truly translate how the child feels, as some aspects of empathy are not necessarily externalized. Additionally, children might behave differently with less familiar others, like at their day-care. Secondly, concurrent validity should also address the relation of the three facets of empathy with internalizing behaviours, or a more comprehensive measure of emotion regulation. As previously mentioned, preschoolers' emotion dysregulation may be more internalized than externalized; however, only the latter was addressed in the current study. Therefore, a measure of internalizing behaviours would further improve the divergent validity of the EmQue. Thirdly, our study only included preschool-aged children, which prevent us from assessing the validity of the EmQue in Portuguese children across different stages of childhood. Therefore, future studies regarding the Portuguese population should also explore the validity of this instrument for toddlers, providing a deeper understanding of the development of the three facets of empathy, and the assumptions made regarding emotion contagion. The present study showed that the EmQue is a valid questionnaire that can be used in Portugal for clinical and research assessments. The EmQue has shown validity in the evaluation of empathy in different languages, and cultures (Grazzani et al., 2016; Lazdauskas & Nasvytien ˙e, 2020; Lucas-Molina et al., 2018; Rieffe et al., 2010; Takamatsu et al., 2021). Aspects such as parenting styles and social norms are interrelated with the development of empathy (Trommsdorff, 1995), and these might change in different cultures. Therefore, the EmQue might further contribute to the understanding, and the comparison of the factors that

influence the empathic experiences of individuals across countries. The EmQue is an easy-to-apply questionnaire that can distinguish the three levels of empathy that are manifested in early childhood. Given the lack of studies on the empathy of Portuguese preschool children, the EmQue will allow a better understanding of young Portuguese children's emotional development with typical and atypical development. Nonetheless, future studies should examine the validation of this instrument for Portuguese toddlers, in order to expand the validity of the instrument toa wider age range.

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Chapter 5

Empathy and emotions in deaf or hard-of-hearing preschoolers

Da Silva, B.M.S., Rieffe, C., Frijns, J.H.M., Sousa, H., Monteiro, L., Veiga, G. [Submitted]. Empathy and emotions in deaf or hard-of-hearing and hearing preschoolers.

ABSTRACT

Empathy is a crucial aspect of children's daily lives, as it helps them to understand others and build strong bonds with others. In this study we examined the extent to which empathy levels (i.e. emotion contagion, attention to others' emotions, and prosocial actions) differed in deaf or hard-of-Hearing versus hearing children, and the unique contribution of emotion regulation and emotion recognition to each of these levels. Thirty two DHH and 149 hearing preschoolers participated in this study. Caregivers rated their children's empathy, emotion recognition, and emotion regulation. Hearing and language related factors were analysed as possible control variables. Children performed tasks to assess language comprehension, production and pragmatics; emotion vocabulary was measured through parent reports. Clinical information was obtained through each child's designated doctor. Both groups showed similar levels of empathy, emotion recognition and emotion regulation, but DHH showed lower language skills. Better emotion recognition, regulation and vocabulary were associated with more prosocial actions in both groups. The current findings shed a positive perspective on DHH preschoolers emotional development, and suggest that being bilaterally rehabilitated may contribute to better social access in a predominantly hearing environment.

INTRODUCTION

Empathy, also called “the social-glue of human relationships”, is a crucial aspect of social interactions throughout life, and it can be defined as the ability to share others’ emotional states and show concern towards them (Hoffman, 2001). From birth until the preschool years children go through three subsequent, but not mutually exclusive levels of empathy: emotion contagion, attention to others’ emotions, and prosocial actions (Hoffman, 1987). Although emotion contagion is presumably innate, the other two levels of empathy rely on social learning opportunities (Davidov et al., 2020; de Waal, 2008; Decety et al., 2016), which might be more difficult to access for children who are deaf or hard-of-hearing (DHH) compared to their hearing peers, because children’s social environment is predominantly hearing and thus often does not, or only partially, take into account the special needs or requirement needed for DHH children to fully participate, such as clear turn taking and showing the DHH child your face when talking (NCDS, 2015). These limited opportunities for social learning seemed to have an impact on DHH children’s emotional development in previous studies, but this is yet unknown regarding empathy and related factors, such as emotion recognition and regulation. Therefore, differences in the levels of empathy between DHH and hearing preschoolers, and the unique associations of these empathy levels with emotion recognition and emotion regulation are the focus of this study.

SOCIAL LEARNING IN HEARING AND DHH CHILDREN

Social learning, i.e., learning in and from the social environment, largely depends on ‘incidental learning’, which can be defined as unintentional or unplanned learning from the social environment that arises when children observe and/or overhear how others interact (Bandura, 1977; Kelly, 2012). Children’s socio-emotional development greatly relies on these opportunities to observe and / or overhear how others’ communicate their emotions, negotiate, argue, and problem-solve among one another (Moeller, 2007; Saarni, 1999). Everyday opportunities for incidental learning are available across the various contexts that children spend time in (e.g., at home, preschool, and neighborhood). However, access to these different social situations can be less easy for many DHH children who grow up in a predominantly hearing world.

Notwithstanding different kinds of technology to improve DHH children's hearing, their access to the auditory environment is not to the level of hearing children. For example, although cochlear implants (CIs) are effective in transmitting sounds and decoding speech in quiet environments, CI users often report difficulties picking up speech in noisy environments like playgrounds, locating where sounds are coming from, and perceiving pitch and prosodic cues (Jiam et al., 2017; Paquette et al., 2023; Pisoni et al., 2017). These factors can diminish opportunities for DHH children to join their peers in situations where spoken language is important. Moreover, attitudes of peers who have no hearing loss, and a lack of awareness on how to communicate with their DHH peers, can add to this (Musau, 2021). For example, group interactions can be more difficult as children with a CI might be unable to determine who is talking, following the conversations from different people can be exhausting, and poor acoustics can cause listening fatigue (Arioli et al., 2023). Furthermore, the quality of DHH children's social interactions with their hearing peers might also be affected, because DHH children might miss out on words in conversations, misinterpret a joke, or it can be more difficult for them to grasp the emotion expressed in the voices of their peers (Arioli et al., 2023; Jiam et al., 2017).

All these aspects might limit DHH childrens' opportunities for incidental learning and social participation, which can prevent DHH children from developing and/or showing of their empathic skills, unlike in the same way that hearing children do: by observing the social world around them, and by spontaneously interacting with their peers.

LEVELS OF EMPATHY IN HEARING AND DHH CHILDREN

Children are born with an innate capacity to mimic or synchronize with other people's emotional states, also referred to as 'emotion contagion' (Davidov et al., 2013, 2020; de Waal, 2008). For example, most babies start crying while hearing and/or seeing another baby cry (Hoffman, 2000; Simner, 1971). Studies with DHH children have shown that their levels of emotion contagion are similar to their hearing peers, which is in line with the assumption that this level of empathy is innate (Ketelaar et al., 2013; Tsou, Li, Wiefferink, et al., 2021). For example, emotion contagion levels of DHH and hearing toddlers and preschoolers were similar based on parental reports, and observational tasks in which the experimenter pretended to hurt herself, or be angry with a pen that did not work (Ketelaar et al., 2013). These similar levels of

contagion seem consistent across age groups (e.g. older-children and adolescents), and methods (e.g. observations and parental reports) (Dirks et al., 2017; Netten et al., 2015; Tsou, Li, Wiefferink, et al., 2021). Therefore, feeling contagion seems to be common to most children, independent of individual differences.

Although an important part of social bonding, emotion contagion can also feel overwhelming for young babies as they still have difficulties in regulating their levels of arousal (Bird & Viding, 2014; Davidov et al., 2013). For example, although the 'triggering' emotional distress is not their own, young babies often show self-focused concern by signaling that they need comfort (Batson, 1991; Davidov et al., 2013). Therefore, a crucial step in the transition from emotion contagion to attention to others' emotions is the ability to decrease levels of arousal so that others can become the focus of attention, thus showing other-focused concern (Bird & Viding, 2014; Hoffman, 1990).

Other-focused concern becomes visible when babies show attention to others' emotions, which is the second level of empathy (Hoffman, 1987). Attention to others' emotions is visible in young babies when they orient towards the person in distress, and as children grow older they start to show concerned facial expressions, or stop their play or activities to direct their focus to others (Hoffman, 1987; Roth-Hanania et al., 2011). Moreover, attention to others' emotions can be seen as the primary steps of emotion understanding, as paying attention to others is necessary to understand how they feel (Tsou, Li, Wiefferink, et al., 2021). Studies with DHH children have shown that their levels of attention to others' emotions are similar to their hearing peers (Ketelaar et al., 2013; Tsou, Li, Wiefferink, et al., 2021). These results could indicate that similarly to emotion contagion, attending to others' emotions might be innate and/or not fully depend on social learning (Ketelaar et al., 2013).

As children show progressively more signs of attention to others' emotions, they also begin to show support and comforting behaviors aimed to alleviate others in distress, which we refer to as prosocial actions, the third level of empathy (Hoffman, 1987; Rieffe et al., 2010). As children grow older, prosocial actions increase in both hearing and DHH children, although research showed that DHH children tend to respond less prosocially than their hearing peers (Tsou, Li, Wiefferink, et al., 2021). For most children caregivers are their first models on how to act prosocially (Eisenberg & Fabes, 1998; Hoffman, 2000), for example when a parent discusses how compassionate they felt towards another person's situation, or they help others in the presence of the child (Hoffman, 2001). However, for obvious reasons, DHH children are

disadvantaged here, as they are often unable to overhear these kinds of conversations. Besides the family environment, interactions with peers are important opportunities for children's prosocial development (Jambon & Malti, 2022; Rieffe et al., 2015). However, peer interactions typically occur in noisy environments like playgrounds, which make it more difficult for DHH children to join in, thus showing fewer comforting behaviors (Arioli et al., 2023; Tsou, Li, Wiefferink, et al., 2021). Therefore, all these different aspects might hinder opportunities for DHH children to train and develop their prosocial skills.

THE IMPORTANCE OF EMOTION RECOGNITION AND EMOTION REGULATION

As children progress in their empathy levels, also other aspects of their emotional development come into play, i.e., emotion recognition and emotion regulation in particular. Helping or comforting others who are in distress, requires children to put together pieces of information that signal what the other needs. Emotion recognition is not only one of those pieces, but is considered as an important starting piece of this emotional puzzle (Lyusin & Ovsyannikova, 2016; Song, 2021).

Also, these aspects of children's emotional development, emotion recognition and regulation, rely heavily on children's access to their social world and thus opportunities for social learning. Again, DHH children might be disadvantaged in this if the hearing world does not provide sufficient support to DHH children to participate fully in daily social interactions like their hearing peers. Compared to their hearing peers, DHH children tend to have more difficulties in decoding others' emotion expressions (Sidera et al., 2017; Wang et al., 2019; Wiefferink et al., 2013). These difficulties may, in turn, influence DHH children's empathic behaviors to some extent, as recognizing an emotion is an important cue that someone is in distress and in need of comfort/support. In line with this assumption, previous research with hearing children has shown that children with better emotion recognition skills also pay more attention to others' emotions and show more prosocial behaviors (Da Silva et al., 2022). Similarly, a positive association between emotion recognition and social competence in DHH children was also confirmed (Ketelaar et al., 2013).

Regarding emotion regulation, its interrelation with empathy might be particularly important in the transition from emotion contagion to attention to others' emotions, and in turn, to act prosocially. This shift from empathic self-distress to other-oriented empathy largely depends

on the child's ability to control the arousal felt in the presence of someone in distress, i.e., the ability to regulate emotions (Bird & Viding, 2014; Davidov et al., 2013, 2020). Emotion regulation can be defined as the ability to modulate the levels of physiological and emotional arousal, and respond adaptively to a given situation (Gross & Thompson, 2007). Previous studies with hearing children have shown that children with lower levels of emotion regulation tend to experience higher levels of emotion contagion, and show fewer prosocial behaviors (Rieffe et al., 2010; Tsou, Li, Wiefferink, et al., 2021). Although levels of emotion regulation seem similar in DHH and hearing children (Ketelaar et al., 2015; Tsou, Li, Eichengreen, et al., 2021; Tsou, Li, Wiefferink, et al., 2021), its relation with the three levels of empathy in DHH children is yet to be known.

PRESENT STUDY

Empathy guides social interactions from a very young age (Hoffman, 2000). Although the initial signs of empathy are assumed to be innate, developing this very important skill requires exposure and practice, which is not equally accessible to all children, as it is the case of DHH children. DHH children face more challenges than their hearing peers in navigating the social world, limiting their opportunities for social learning, which may impact the manifestation of their empathic skills (Arioli et al., 2023; Jiam et al., 2017; Paquette et al., 2023). However, research on the different levels of empathy (i.e. emotion contagion, attention to others' feelings, and prosocial actions) in DHH preschoolers is scarce. To the best of our knowledge, no previous study has focused on describing and comparing the three levels of empathy separately in DHH and hearing preschoolers. Furthermore, the interrelation between the three levels of empathy and two important skills within the domain of emotional competence (emotion recognition and emotion regulation), have yet to be studied.

The first aim of this study was to examine the extent to which DHH and hearing preschoolers have similar levels of empathy, taking into account the three levels: emotion contagion, attention to others' emotions, and prosocial actions. Based on previous research which included infants and preschoolers, we expected that DHH preschoolers would show similar levels of emotion contagion and attention to others' emotions, and lower prevalence of prosocial actions, compared to their hearing peers (Ketelaar et al., 2013; Tsou, Li, Wiefferink, et al., 2021).

Second, we examined the extent to which the two emotion skills (i.e., emotion recognition and emotion regulation) were uniquely related to preschoolers' levels of empathy. Based on previous research with hearing children, we expected emotion recognition to be positively related to attention to others' emotions and prosocial actions, in both groups (da Silva et al., 2022). Regarding emotion regulation, based on previous studies we expected that preschoolers with lower levels of emotion regulation would show higher levels of emotion contagion and lower levels of prosocial action (Rieffe et al., 2010; Tsou, Li, Wiefferink, et al., 2021). Additionally, we did not expect differences in the strengths of the relationships between these concepts for the DHH preschool children in our study.

Third, we aimed to understand the extent to which hearing factors and language indices were associated with the three empathy levels. Previous research has shown no relation between these factors, empathy and other emotional skills in DHH children who predominantly communicate through oral language, and are early users of hearing devices (i.e. hearing aid, cochlear implant), which is the case of our sample (Antia et al., 1998; Leigh et al., 2009; Patrick et al., 2018; Stevenson et al., 2015; Theunissen et al., 2015; Tsou, Li, Wiefferink, et al., 2021). Therefore, we expected that hearing factors (i.e., hearing age, type of hearing device, and degree of hearing loss), and language indices (i.e., emotion vocabulary, language comprehension, production and pragmatics) to be unrelated with the three levels of empathy.

METHOD SECTION

Participants and Procedure

A total of 32 DHH (Mage = 58.06 months, SD = 11.06 months; 63% boys) and 149 hearing (Mage = 60.08 months, SD = 10.88 months; 52% boys) preschoolers participated in this study (Table 1). The DHH preschoolers were recruited directly by their reference doctors from two hospitals in Lisbon. Among the DHH preschoolers, 18 were with bilateral cochlear implants (CI), 10 with bilateral hearing aids (HA), and 4 with CI in one ear and HA in the other. All DHH children used aural communication as their primary modality. Caregivers of these children were first informed about the purpose and planning of the study and asked to indicate their willingness to participate. Caregivers also indicated the preschool that their DHH child attended. Next, all preschools and caregivers of preschoolers in the same classes as the DHH child were asked to provide written consent for their children to participate in the study. All participating caregivers filled out the Empathy Questionnaire (EmQue; da Silva et al., 2022;

Rieffe et al., 2010), and the Emotion Expression Questionnaire (EEQ; Rieffe et al., 2010) on paper for every participating child. Approval for the study was obtained from the Ethical Committees of Leiden University, the Portuguese National Committee of Data Protection, and the Portuguese Directorate of Education.

Table 1. Demographic characteristics of participants

	Total study population		DHH study population		
	Hearing	DHH	Bilateral CI	Bilateral HA	Bimodal (CI&HA)
No. of children	149	32	18	10	4
Age					
Mean – in months (SD)	60.08 (10.88)	58.06 (11.06)	57.17 (10.22)	60 (12.02)	57.25 (14.86)
Range – in months (SD)	36 – 79	37 - 79	37 - 73	41 - 79	40 – 72
Gender					
Male (%)	77 (51.7%)	20 (62.5%)	10 (55.6%)	7 (70%)	3 (75%)
Language Indices					
Emotion Vocabulary**	.70 (.17)	.51 (.23)	.54 (.27)	.43 (.19)	.53 (.12)
Comprehension**	.96 (.08)	.88 (.11)	.87 (.12)	.89 (.07)	.88 (.18)
Production**	.97 (.07)	.72 (.33)	.71 (.37)	.71 (.31)	.79 (.23)
Pragmatics**	.56 (.33)	.17 (.30)	.20 (.33)	.09 (.17)	.21 (.42)
Degree of hearing loss					
Moderate – 40 – 60 dB (%)		3 (9.4%)		3 (30%)	
Severe – 61 – 90 dB (%)		7 (21.9%)		7 (70%)	
Profound - > 90 dB (%)		19 (59.4%)	18 (100%)		1 (25%)
Severe & Profound (%)		3 (9.4%)			3 (75%)
*Hearing age***	60.08 (10.88)	38.41 (12.17)	41.50 (9.30)	32.60 (12.75)	39.00 (19.58)

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

Measures

Empathy was measured by the Portuguese version of the EmQue (da Silva et al., 2022; Rieffe et al., 2010). This caregiver-report questionnaire is composed of 15 items representing three scales that measure the levels of empathy: Emotion Contagion (five items), Attention to Others' Emotions (six items), and Prosocial Actions (four items). Caregivers were asked to rate the prevalence of each described behaviour in their child over the past 2 months in a 5-point scale (1 = (almost) never; 5 = (almost) always). The final score of each level of empathy was obtained by averaging the score obtained in each of the items within that specific scale. Higher total mean scores correspond to higher levels of empathy.

Emotion Recognition, is a scale in the EEQ (35 items; Rieffe et al., 2010). The Emotion Recognition scale (6 items; e.g., "Can your child properly assess the emotions of others?", "Does your child know when you are happy?") aims to assess the extent to which children recognise others' emotions. Caregivers were asked to rate the prevalence of each described behaviour in their child over the past 2 months on a 5-point scale (0 = (almost) never/very easy; 4 = (almost) always/very difficult). Higher total mean score corresponds to better emotion recognition in children.

Emotion Regulation is also a scale in the EEQ caregiver report (Li et al., 2020; Rieffe et al., 2010), aimed to assess the extent to which children can regulate their emotions when they are afraid, angry or sad (12 items; e.g., "Is your child easily calmed down when they are angry?", "How long do angry episodes last usually?"). Caregivers were asked to rate the prevalence of each described behaviour in their child over the past 2 months on a 5-point scale (0 = (almost) very easy/ 1 min; 4 = (almost) very difficult/ + 60 min). Higher total mean score corresponds to lower emotion regulation skills in children.

Language Indices, namely language comprehension, production and pragmatics were measured by the TALC tasks (Sua-Kay & Tavares, 2007). For language comprehension, children were faced with 12 designated objects (Task 1), and the instructor asked the child "where is (the object; e.g. tree, chair, key)?". If the child pointed correctly to the object they got a rating of 1. For Task 2 children were faced with 20 images divided in three categories: objects (6); activities (6); semantic relationships (8). The instructor asked the child "where is (the object) / who is (doing a certain activity)/ which one of the objects is (a certain characteristic)?". If the child pointed correctly to the object they got a rating of 1. The language

comprehension score was obtained by averaging the score obtained for each object/image. Higher scores correspond to better language comprehension skills. For language production children were faced with the same objects and images. For the object tasks the instructor pointed to the object and asked the child to name it (Task 3). If the child named the object correctly, they got a rating of 1. For the images task (Task 4) the instructor pointed to an image and asked the child to name the object/action/characteristic that was shown (Task 4). If the child named the object/action/characteristic correctly they got a rating of 1. The language production score was obtained by averaging the scores obtained for each object/image. Higher scores correspond to better language production skills. For pragmatics (Task 5) children were faced with an image of a classroom showing different scenarios (e.g. children playing together, children doing activities alone, teacher interacting with a child). While looking at the image, the instructor pointed to a certain character, presented a situation and ask the child what they would say in that specific situation which relates to daily scenarios (e.g. while pointing to the child at the entrance of the classroom, the interviewer asked "This child just arrived to the classroom. What should they say?"). Children were presented with 6 different scenarios, and for each they got a rating of 1 if the answer was correct. The pragmatics score was obtained by averaging the scores obtained for each scenario. Higher scores correspond to better pragmatics skills.

Additionally, Emotion Vocabulary was measured through a 20 item caregiver report that measures children's knowledge of emotion words (Ketelaar et al., 2015; Veiga et al., 2023). Caregivers were asked whether their child knew/used 20 emotions (e.g. "happy", "angry") and mental states (e.g. "dream", "know") by replying yes = 1 or no = 0. A higher total mean score indicated better emotion vocabulary in children.

Lastly, Hearing Factors, namely hearing age, degree of hearing loss and type of hearing device were obtained directly from each child's designated doctor.

STATISTICAL ANALYSES

The statistical analyses were conducted using IBM SPSS 28.0.1 version. An alpha error of less than or equal to .05 was used to determine significance. Internal consistency of the EmQue and EEQ scales were assessed using Cronbach's alpha and inter-item correlations. Group comparisons on the levels of empathy, emotion recognition and emotion regulation

between DHH and hearing preschoolers were conducted using Independent Samples T-tests. To assess whether hearing factors (i.e. hearing age, degree of hearing loss, and type of hearing device), language (i.e. comprehension, production, and pragmatics), and emotion vocabulary were associated with the three levels of empathy, Pearson's correlations were conducted. Out of all the analysed factors, only emotion vocabulary was associated with empathy, specifically to prosocial actions (Table 5), and therefore this factor was included in the subsequent regression analyses as a control variable. The unique contribution of emotion recognition and emotion regulation to the three levels of empathy was examined through three hierarchical regression analyses. In the first step, we entered the group (Hearing = 0, DHH = 1), the two emotion skills (i.e. emotion recognition and emotion regulation, and emotion vocabulary as the covariate. In the second step, we added the interactions of the group with each of the two emotion skills. Lastly, for exploratory purposes, a series of Independent Samples T-tests were conducted within the DHH group, to compare the studied variables between children with bilateral CIs (n = 18) and those with bilateral HAs (n = 10). DHH children with bimodal hearing (CI and HA) were not included in this analysis due to small sample size (n = 4).

RESULTS

The descriptive and psychometric properties of the three levels of empathy, emotion recognition, emotion regulation, and emotion vocabulary are reported in Table 2. The internal consistencies of the EmQue scales were good, with the Cronbach's alpha ranging from acceptable (regarding Emotion Contagion and Attention to Other's Emotions scales) to good (regarding Prosocial Actions scale). The inter-item correlation values of the Emotion Contagion and Attention to Other's Emotions were within the ideal range (i.e, .15 to .50; Clark & Watson, 1995). The inter-item correlation of the Prosocial actions was slightly over the desired value, which suggests that the items of this scale are more closely related, measuring a more narrowed construct. The internal consistencies of Emotion Recognition and Emotion Regulation scales were acceptable, and the inter-item correlations were within the ideal range. The internal consistency of the Emotion Vocabulary scale was good, and the inter-item correlation value was also within the ideal range.

Table 2. Descriptives and internal consistencies of the three EmQue scales; emotion recognition, emotion regulation and emotion vocabulary scales.

	N	No. items	Range	Cronbach's Alpha	Mean inter-item correlation	Mean Total (SD)
			Empathy Questionnaire			
Emotion contagion	181	5	1 – 5	.73	.34	1.44 (.69)
Attention others' emotions	181	6	1 – 5	.78	.37	2.48 (.66)
Prosocial actions	181	4	1 – 5	.85	.59	2.13 (.83)
			Emotion Expression Questionnaire			
Emotion Recognition	181	6	0 – 4	.70	.28	2.87 (.60)
Emotion Regulation	181	12	0 - 4	.70	.16	1.45 (.43)
			Emotion Vocabulary Questionnaire			
Emotion Vocabulary	178	20	0 -1	.85	.23	.66 (.20)

Group differences in empathy, emotion recognition and emotion regulation

Independent samples t-tests showed that mean scores on the three empathy scales did not differ between the DHH and hearing group (see Table 3). Furthermore, DHH and hearing preschoolers also did not differ on their emotion recognition ($t = 2.86$, $p = .367$) and emotion regulation skills ($t = 1.43$, $p = .098$) reported by caregivers.

Table 3. T-test results comparing the three EmQue levels, emotion recognition and emotion regulation between hearing and DHH preschoolers

	Mean Hearing (SD)	Mean DHH (SD)	t-test	p
	Empathy Questionnaire			
Emotion contagion	1.41 (.67)	1.57 (.80)	-1.26	.104
Attention others' emotions	2.49 (.67)	2.42 (.63)	.43	.333
Prosocial actions	2.12 (.81)	2.20 (.91)	-.53	.286
	Emotion Expression Questionnaire			
Emotion Recognition	2.86 (.56)	2.90 (.76)	2.75	.367
Emotion Regulation	1.43 (.41)	1.54 (.49)	6.35	.098

Unique contribution of emotion recognition and regulation

As shown in Table 4, emotion vocabulary was correlated to prosocial actions. Therefore, this factor was included in the hierarchical regression analyses. Table 5 shows the results of the hierarchical regression models. In the first step, group, emotion recognition, emotion regulation, and emotion vocabulary were entered. In the models for emotion contagion and for attention to others' emotions, no effects of emotion recognition, regulation and vocabulary were observed. Adding group interaction terms in the second step did not improve the model fits, suggesting that this lack of effects was similar between groups.

Table 4. Correlations between the three levels of empathy, hearing age, language related factors, and emotion vocabulary for the total group (DHH/Hearing).

	Emotion Contagion	Attention to Others Emotions	Prosocial Actions
Hearing Factors	- .02 (.05 / .04)	- .03 (-.05/ -.07)	.09 (-.18/ .22)
Hearing Age	- .02 (.05 / .04)	- .03 (-.05/ -.07)	.09 (-.18/ .22)
Hearing Device	.07 (-.08 / -)	- .01 (.13 / -)	.07 (-.18 / -)
Degree of Hearing Loss	.08 (-.04 / -)	- .03 (.13 / -)	.05 (.15 / -)
Language indices			
Emotion Vocabulary	.04 (.05 / .09)	.12 (.17 / .11)	.15* (.20 / .17*)
Language Comprehension	- .19 (-.34 / .02)	.04 (-.01 / .03)	.16 (.01 / .31)
Language Production	- .22 (-.32 / -.02)	-.01 (-.10 / -.01)	- .07 (-.25 / .20)
Language Pragmatics	.04 (.06 / .10)	.07 (.16/ -.00)	.14 (. 02/ .22)

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

In the model for prosocial action (Table 5) we observed effects of emotion recognition , b = .22, 95% CI [.03, .42], emotion regulation, b = -.32, 95% CI [-.59, -.05], and emotion vocabulary, b = .73, 95% CI [.08, 1.37]. These outcomes suggest that children with better emotion recognition, regulation and vocabulary show more prosocial actions. Adding group interaction terms did not improve the model fit

Table 5. Hierarchical regression analyses with emotion recognition, emotion regulation and emotion vocabulary

	Emotion Contagion			Attention to Others Emotions			Prosocial Actions		
	b	p	95% CI	b	p	95% CI	b	p	95% CI
Step 1		$R^2 = .023$			$R^2 = .029$			$R^2 = .088$**	
Group	.19	.199	[-.10, .49]	.03	.845	[-.25, .31]	.22	.190	[-.11, .55]
Emotion Recognition	.00	.961	[-.18, .17]	.13	.108	[-.03, .30]	.22	.026	[.03, .42]
Emotion Regulation	.16	.193	[-.08, .40]	-.01	.964	[-.24, .23]	-.32	.021	[-.59, -.05]
Emotion Vocabulary	.30	.311	[-.28, .87]	.39	.160	[-.16, .93]	.73	.027	[.08, 1.37]
Step 2		$\Delta R^2 = .021$			$\Delta R^2 = .009$			$\Delta R^2 = .006$	
Group	-1.00	.126	[-2.52, .31]	.41	.555	[-.95, 1.76]	-.36	.834	[-1.96, 1.25]
Emotion Recognition	-.11	.296	[-.31, .10]	.13	.189	[-.06, .32]	.16	.182	[-.07, .39]
Emotion Regulation	.11	.441	[-.17, .38]	.07	.593	[-.19, .34]	-.32	.047	[-.63, .00]
Emotion Vocabulary	.32	.280	[-.26 , .89]	.34	.217	[-.20, .89]	.72	.041	[.07, 1.37]
Group x Recognition	.36	.066	[-.02, .74]	.04	.816	[-.32, .41]	.23	.280	[-.20, .67]
Group x Emotion Regulation	.17	.559	[-.41, .75]	-.34	.228	[-.90, .21]	-.06	.812	[-.72, .59]

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

Differences and Similarities within the DHH group

To explore differences and similarities within the DHH group, further analysis were conducted between children with bilateral cochlear implants (n = 18; Mage = 57.17 months, SD = 10.22 months) and bilateral hearing aids (n = 10; Mage = 60 months, SD = 12.02). Results showed that CI and HA children differed in their hearing age (t = 2.13, p = .04), with children with CI having a higher hearing age (Mage = 41.5 months, SD = 9.30 months) compared to children with a HA (Mage = 32.60, SD = 12.75 months). No differences appeared regarding language indices, empathy levels, emotion recognition, emotion regulation and emotion vocabulary within the DHH group.

DISCUSSION

Empathy serves an important guidance for children's social interactions. Being empathic allows children to synchronize with others' emotional states, triggers concern and supporting behaviors, thus creating opportunities for social bonding, and for deeper interpersonal connections (Davidov et al., 2020; Hoffman, 1987, 2001). Although empathy is partially innate, social interactions shape how adaptive children put their empathy into practice over time. As it is widely known, social learning does not come easy to all children due to certain limitations or barriers in the (social) environment, as it is often a daily reality for DHH children, which in turn, could impact their empathy development, and which was the focus of this study. Our results partially confirmed our assumptions, whereas some unexpected findings also arised.

First, as expected, emotion contagion and attention to other's emotions did not differ between DHH and hearing children. Yet, unexpectedly, both levels of empathy were unrelated to emotion recognition or emotion regulation. Second, unexpectedly, DHH children showed equal levels of prosocial actions compared to their hearing peers. As expected, more prosocial actions were associated with better emotion recognition and emotion regulation in both groups. Third, as expected, language comprehension, production and pragmatics were unrelated to the three empathy scales. Yet, emotion vocabulary contributed to the prediction of prosocial actions in both groups. Additionally, hearing factors were unrelated to the three empathy levels. Implications of these findings will be further explored below.

Importantly, in the current study, all 3 levels of empathy were similar in DHH and hearing peers. Note that in previous studies, in which DHH children scored lower on prosocial actions compared to their hearing peers, a large percentage of the DHH children received hearing intervention only in one ear (33% in Netten et al., 2015; 20% in Tsou et al., 2021) and were implanted after 2 years of age (3.6 years in Netten et al., 2015; 2.5 years in Tsou et al., 2021), whereas all children in our sample were treated earlier and bilaterally (Table 1). This difference in the time and mode of intervention between samples, is a reflection of different views regarding early intervention of DHH children that changed over time. For many years the policies and insurance schemes for early hearing intervention were reserved for children over the age of two, and prioritized restoring the hearing of the more affected ear, which was seen as more cost-effective (Bond et al., 2009; Harrison et al., 2003; Van de Heyning et al., 2022). However, recent guidelines now not only advocate for intervention before 12 months of age for all DHH children, but also emphasize bilateral rehabilitation as the preferable intervention for DHH children with bilateral hearing loss offers better auditory and developmental improvements to DHH children, and some countries - but not all - have changed their policies accordingly (NICE, 2019; Van de Heyning et al., 2022).

Research has shown that DHH children who have access to early auditory restorative intervention show better outcomes in their language and neurocognitive development (Geers & Nicholas, 2013; Naik et al., 2021; Nikolopoulos et al., 1999). Although research has yet to look into the contribution of early versus later intervention for socio-emotional development of DHH children, it seems plausible to assume that early intervention promotes better access to children's social world, and thus better outcomes in their language development and other areas of development that require social learning. Furthermore, children with only unilateral hearing have lower speech perception, more difficulties in locating where sounds are coming from, and rely more on visual cues to gain access to social information, compared to children with bilateral hearing (see Gordon et al., 2013, for a review). All these factors might also hinder children's opportunities for social learning if the hearing environment is unaware of these often invisible barriers and thus unable to take precautions and facilitate also DHH children with better access to their social world. Considering that preschoolers' social interactions during recess are rarely one-on-one, and occur in areas with noisy backgrounds, the social participation of DHH children with a single hearing device could have been even more affected compared to

children with bilateral hearing (Gordon et al., 2013; Grieco-Calub & Litovsky, 2010; Salloum et al., 2010).

While language production, comprehension and pragmatics were unrelated to the three empathy levels, emotion vocabulary was positively associated with prosocial actions, over and above children's levels of emotion recognition and regulation, respectively. Compared to the other language indices used in this study, emotion vocabulary goes beyond general language skills, because it more specifically targets children's understanding and use of emotions and mental states (Ketelaar et al., 2015). Especially the use of a mental states vocabulary is a clear indication that children can distinguish between different perspectives on reality, or a so-called Theory of Mind (Ketelaar et al., 2015; Peterson, 2004; Premack & Woodruff, 1978). Prosocial actions may become more effective when they are not idiosyncratic, as usually observed in very young children, but instead based on the needs of the person in distress, which indeed requires Theory of Mind (Qiu et al., 2024).

LIMITATIONS AND FUTURE DIRECTIONS

The current study compared DHH and hearing preschoolers' empathic skills and their association with emotion recognition and emotion regulation. Our findings allowed us to understand that DHH children who receive early hearing intervention bilaterally do not differ from their peers regarding the aforementioned emotion skills, which stress the idea that early, and adequate, intervention can serve children with better access to their social world, thus increasing their opportunities for social learning. Nevertheless, some considerations are needed when interpreting our results.

First, our results may not be generalized to all DHH children, as this group is very heterogeneous. DHH children in our group all received early and bilateral intervention and used oral language as their primary method of communication, which means that they benefited from more restorative and therapeutic interventions than DHH children with other characteristics (e.g., with mild/moderate/unilateral hearing loss; or receiving intervention in one ear only). Thus, differences in the DHH samples may lead to different developmental paths, as for example is suggested by our finding regarding prosocial actions. Thus, future studies may further examine the impact of unilateral or bilateral implantations on children's access to social learning, group dynamics and their prosocial

development in particular. Additionally, we need to consider that the socioemotional aspects focused on our study might develop and manifest differently in DHH children who are exposed to natural sign language from early ages, and have other DHH peers and adults in their social network, as they might be less likely to face the barriers that DHH children in the current study face, regarding exposure to social learning and social participation in the peer group. Therefore, we suggest that future studies recruit a larger sample size, including a more heterogeneous group of DHH children, thus allowing us to better understand how this variability impacts empathy, emotion recognition and emotion regulation, and the associations between them.

Second, our study was cross-sectional, which prevents us not only from drawing any causal relations, but also from understanding whether our outcomes maintain stable over time or are only applicable to the preschool ages. We suggest that future studies apply a longitudinal approach, thus allowing us to understand the developmental trajectory and over-time associations between empathy, emotion recognition and emotion regulation.

Third, the main variables of this study (i.e., empathy, emotion recognition and emotion regulation) were all collected through parent reports, thus we had a single-informant design. Previous studies have shown that caregivers of children from clinical groups can be more biased when reporting on their child's emotional competence, which could have influenced reports from our DHH children. Therefore, future studies should collect data from different methods and informants (e.g. playground observations, tasks, teacher reports), to reduce possible bias on the results.

Fourth, this study focused on children's emotional functioning, and we discussed the importance of access to the social environment for children to develop these aspects to their full potential. Yet, these opportunities are not equal for DHH and hearing children if adaptations are not made to better facilitate DHH children, i.e. special paneling or tiles to provide better acoustics. Future studies could combine aspects in the built and / or social environment and examine how certain adaptations provide better access for different children.

CONCLUSION AND CLINICAL IMPLICATIONS

The current study shows a positive scenario of DHH preschoolers in comparison to their hearing peers. Although the DHH children in our study showed lower language abilities than their hearing peers, they showed similar levels on the three emotion skills (i.e. empathy, emotion recognition, and emotion regulation). Furthermore, no differences appeared regarding language and emotional functioning between CI and HA users. This suggests that DHH preschoolers, regardless of their type of intervention, need more support regarding their general language abilities, and - for example - they might need better hallways or classrooms so that also DHH children can participate in small talk with their peers during the informal time in school, similar to their hearing peers. Yet, it is important to note that the DHH children seem able to overcome their hindered linguistic access to the social world, and match their hearing peers on their emotional competence. The fact that all DHH children in our study received early hearing intervention bilaterally might have contributed to these positive outcomes and give DHH children better opportunities for social learning. Nevertheless, it is equally important to focus on possible adaptations to children's environment needed to facilitate opportunities for social learning.

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Chapter 6

Do my reactions outweigh my actions?

The relation between reactive and proactive aggression with peer acceptance in preschoolers.

Da Silva, B.M.S., Veiga, G., Rieffe, C., Endedijk, H.M., & Güroğlu, B. (2023). Do my reactions outweigh my actions? The relation between reactive and proactive aggression with peer acceptance in preschoolers. Children, 10(9), 1532. https://doi.org/10.3390/children10091532

ABSTRACT

Aggressive behaviours negatively impact peer relations starting from an early age. However, not all aggressive acts have the same underlying motivations. Reactive aggression arises as a response to an antecedent behaviour of someone else, whereas, proactive aggression is initiated by the aggressor and is instrumental. In this study, we aim to understand the relation between reactive and proactive aggression and peer acceptance in preschoolers. Parents of 110 children aged between 3 and 6 years old, rated their children's manifestation of reactive and proactive aggressive behaviours. To assess the children's peer acceptance score within their class they completed a paired comparisons task. The outcomes confirmed that reactive aggression in particular is negatively related to peer acceptance at the preschool age. Our results provide insights for the needs and directions of future research and interventions.

INTRODUCTION

All children develop emotionally and socially through social interactions with their peers. Positive peer interactions at school create a sense of belonging and are related to better mental health (Ng-Knight et al., 2019; O'Connor et al., 2022). Yet, opportunities to play are affected by how much a child is accepted by other children in the peer group, i.e., peer acceptance (Engdahl, 2012; Howes, 1983). In the context of preschool, peer acceptance reflects the degree to which a child is liked by peers within their peer group (Guimond et al., 2022). Thus, accepted children are those who obtain more liking nominations from peers, which is associated with more shared affect and companionship (Guimond et al., 2022). Aggressive behaviours negatively affect peer acceptance. Studies focused on preschoolers' aggression show that higher levels of aggression are related to lower peer acceptance, and more victimization, rejection, and conflicts within the peer group (Diesendruck & Ben-Eliyahu, 2006; Endedijk et al., 2020; Kucaba & Monks, 2022; Stenseng et al., 2014). Furthermore, studies with elementary school aged children and adolescents that distinguish between the motives of aggression – reactive versus proactive – show that these two forms of aggression are differentially related to peer acceptance and peer relationships (Manring et al., 2018; McClain et al., 2022; Stoltz et al., 2016). However, even though reactive and proactive aggression can already be distinguished in preschoolers (Evans et al., 2018; Perry & Ostrov, 2018), the relation between these two forms of aggression and peer acceptance is yet to be studied in this age group, which will be the focus of the current study.

Aggressive behaviours can be observed in toddlers after their first year of life, and tends to be mostly physical, manifested through behaviours such as biting, kicking and hitting (Tremblay et al., 2004, 2018). Albeit undesirable, these behaviours are not yet viewed as defiant, as they reflect the immaturity in regulating and communicating the toddler‘s own negative feelings (Côté et al., 2006; Tremblay et al., 2004; Vaughn & Santos, 2009). These behaviours tend to increase until children are 3-to-4 years of age, yet decrease rapidly after entering a peer group (Girard et al., 2019; Gonzalez-Peña et al., 2013), which can be explained by the social information processing (SIP) model developed by Crick and Dodge (Crick & Dodge, 1994). The SIP model suggests that children's responses to new social situations are influenced by their daily social experiences, and that behavioural responses arise from the way that children process social cues based on six cognitive steps: i) encoding of cues, ii) interpretation of cues, iii)

clarification of goals, iv) response construction, v) response decision and vi) behavioural enactment (Crick & Dodge, 1994; Verhoef et al., 2022). Previous research has shown that children who act aggressively have atypical processing of the aforementioned steps, encoding more hostile cues (step i), interpreting situations as more hostile (step ii), more often opt for revenge or personal gain as a goal (step iii), constructing and deciding on aggressive responses more often (steps iv & v), and evaluating the impact of their aggressive behaviours towards others less negatively (see de Castro & van Dijk, 2017, for a review). Although not part of the original SIP model, emotion processing is understood as an important and interrelated additional element. For example, biased encoding and interpretation (steps i & ii) are related to impaired emotional understanding (Cook et al., 1994; De Castro et al., 2005), and aggressive response construction. Decision and enactment are related to impaired emotion regulation (Cole et al., 1992; De Castro et al., 2005). As children grow older their emotion processing skills are expected to improve and they become more skilful in navigating through the aforementioned steps. However, when these emotion processing skills (e.g., emotional regulation; emotional understanding) are impaired, children are more prone to maintain these aggressive behaviours (Baker, 2022; Diesendruck & Ben-Eliyahu, 2006; Perhamus & Ostrov, 2021; Phillips Keane & Calkins, 2004). Note that biases in different steps result in different types of aggression. For example, biases in interpretation (step ii) are associated with reactive aggression, whereas bias in response decision (step v) is related with proactive aggression (Crick & Dodge, 1996; De Castro et al., 2005).

Reactive aggression is a defensive and impulsive aggressive response to an antecedent behaviour or provocation. In light of the SIP model, reactive aggressive children have an underlying tendency to encode more hostile cues (step i), and interpret the situations (step ii) as more hostile than their peers (Crick & Dodge, 1996; De Castro et al., 2005). These biases are related to impaired emotional understanding and emotional regulation (Crick & Dodge, 1996; De Castro et al., 2005). Thus, reactive aggressive children show an impaired ability to understand their own and other's emotions, causing them to encode and interpret the situations as hostile. The difficulties in regulating their emotions can lead to quick escalation to an aggressive response (physical or verbal) (Cook et al., 1994; Crick & Dodge, 1996; De Castro et al., 2005). More recently, Verhoef and colleagues (Verhoef et al., 2022) have suggested that overtime, children who react aggressively, seem to automatise these reactive aggressive behaviours, as an immediate

response to perceived negative and hostile behaviours by their peers, which can lead to social problems (Camodeca & Goossens, 2005; Dodge, 2006). Indeed, studies with school aged children and adolescents consistently show that more reactive aggressive behaviours are related to lower peer acceptance within the peer group (Manring et al., 2018; McClain et al., 2022). A longitudinal study has also shown that reactive aggressive behaviours during adolescence contributed to the prediction of lower peer acceptance 18 months later (Prinstein & Cillessen, 2003). Although – to the best of our knowledge – no study has addressed the relation between reactive aggression and peer acceptance for preschoolers, other constructs related to social functioning and aggression have been studied. For example, preschoolers who tend to be reactively aggressive are more often rejected within the peer group (Evans et al., 2018).

Proactive aggression is intentional and unprovoked aggressive behaviour is used to achieve a personal goal, hence it is an instrumental form of aggression (Dodge & Coie, 1987). In light of the SIP model, proactive aggressive children have a tendency to decide on the response (step v) that allows them to obtain personal gain, causing conscious harm to others (Crick & Dodge, 1996; De Castro et al., 2005). Impaired empathy and emotional awareness can cause these children to devalue the impact of their actions on others' well-being (De Castro et al., 2005; Tampke et al., 2020). The few studies that have explored peer acceptance and proactive aggression in older children, highlighted that proactive aggression is related to lower acceptance by the peer group (Useche et al., 2014; Walcott et al., 2008). However, proactive aggressive behaviours in adolescents did not predict later peer acceptance (Prinstein & Cillessen, 2003). A longitudinal study that included reactive and proactive aggressive elementary school-aged boys also showed that reactive aggressive boys have increased difficulties with peer interactions and lower peer acceptance, in comparison to proactive aggressive boys (Dodge et al., 1997). The relation between proactive aggression and peer acceptance is yet to be studied in preschoolers, although some studies have examined the relation between proactive aggression and other constructs related to social interactions in preschoolers. A study conducted by Evans and colleagues (Evans et al., 2018) indicated that displays of proactive aggression were related to teachers' perceptions of the child being rejected/isolated from the peer group.

To the best of our knowledge, no study has focused on sex differences in the association between peer acceptance and preschoolers' aggression. Furthermore, research on sex differences regarding the prevalence of reactive versus proactive aggression during

preschool years has shown inconsistent findings, with some studies showing that boys were rated as more aggressive (McClain et al., 2022), and others studies showing that these behaviours are equally manifested by boys and girls (Baker et al., 2019; Perhamus & Ostrov, 2021).

PRESENT STUDY

Peer acceptance is an important indicator of preschoolers' social interactions and a predictor for later maladjustment. Understanding 'if' and 'how' each type of aggression relates to peer acceptance at this young age may provide better guidance for the development of early intervention, to prevent social maladjustment, and allow us to develop more specific and targeted interventions for young children. The first aim of this study was to examine the extent to which reactive and proactive aggression is related to peer acceptance in preschoolers. Considering that peer rejection is related to both types of aggression in this age group (Evans et al., 2018), we expected a negative relation of both reactive and proactive aggression with peer acceptances in preschoolers. The second aim of the study was to examine which type of aggression (i.e., reactive versus proactive) is more strongly related to peer acceptance. Our assumptions for this specific research question are supported by longitudinal studies that indicate that reactive aggression alone has been shown to predict lower peer acceptance (Prinstein & Cillessen, 2003), and that reactive aggressive boys are less preferred within the peer group in comparison to proactive aggressive boys (Dodge et al., 1997). Considering these findings, we expected the relation between reactive aggression and peer acceptance to be stronger compared to the relation between proactive aggression and peer acceptance. Previous research that focused on sex differences regarding preschoolers reactive and proactive aggression are inconsistent (Baker et al., 2019; McClain et al., 2022; Perhamus & Ostrov, 2021). Therefore, we did not formulate specific hypotheses regarding sex differences, but explored possible sex differences.

METHOD

Participants and procedure

A total of 110 children aged between 3 and 6 years old (53% boys; Mage = 61.26 months, SD = 10.05) participated in the study. The participants were recruited directly at preschools in the area of Lisbon, centre and south of Portugal. In total nine classes, each one from a different preschool, participated in the study, with average class size of eleven children (SD = 4.03). This study forms part of a larger study on deaf and/or hard of hearing (DHH) and hearing children. Children from the DHH group were recruited from hospitals in the area of Lisbon, and their parents were asked which preschool their children attended. These preschools were contacted, informed about the purpose and planning of this larger study and their participation was requested. For preschools that agreed to participate, all parents from participating classes were given information about the study and asked to provide written consent for their children to participate. Parents and teachers also filled out paper questionnaires for every participating child. In order to reliably calculate the peer acceptance scores for the current study, only classrooms with a participation rate of at least 80% were included.

In order to allow the children to become familiarised with each other, all assessments took place at least two months into the start of the school year. The researchers went to the preschools on two different days. On the first day the examiner met the children, explained the study and asked them for their verbal consent to participate. On the second day children performed the peer acceptance task in a quiet room with the examiner.

Variables and Materials

Peer acceptance

Peer acceptance was obtained using a computerised assessment of paired comparison (Endedijk & Cillessen, 2015). On the first day of the assessment, an individual picture of each child from the class was taken and uploaded to one tablet. All pictures were numbered so each child was assigned to a specific and random number on the classroom list. In a separate room each child was shown the screen of the tablet. First, to introduce the task, each child was presented with pictures of a pair of toys (either a

bike/ball, bike/train, or ball/train) on the screen and asked to touch the toy that he/she liked to play with the most. Once it was clear that the child had understood how this worked, the experimental task started.

During the experiment, pairs of photos of classmates were presented on the screen, and the experimenter asked "which one of these children do you like to play with the most?". The child was again asked to indicate his/her acceptance regarding a pair of photos by touching the screen, and the procedure was repeated. Initially, the maximum number of pairs (with random matching of photos of all children in the classroom; no pairs were repeated, thus all pairs presented were unique combinations) that were to be shown to each child was set up to 80, however, after the first four data collection sessions, it was clear that the younger children were distracted and uneasy after 40/50 pairs of the experiment. Therefore, the maximum number of pairs presented was adjusted to 45 to ensure that all children could stay focused throughout the task. Comparisons between the average results when children performed the task after viewing 45 pairs and 80 pairs revealed no significant differences in the average peer acceptance score between groups ($t(133) = -.906$, $p = .183$), therefore, we maintained all results in our analysis. For every participant a peer acceptance score was calculated by dividing the number of times the participant was chosen by each specific classmate by the number of times that the participant was presented on the screen. To achieve a general peer acceptance score for each participant, received peer acceptance scores from all classmates were averaged and standardized within each class.

Reactive and Proactive Aggression

Reactive aggression and proactive aggression scores were obtained using the Aggressive Behavior Rating developed by Dodge & Coie (Dodge & Coie, 1987). The questionnaire was administered to parents; who were asked to report on their child's manifestation of reactive aggressive behaviours (3 items; i.e., "When teased, strikes back", "Overreacts angrily to accidents", and "Blames other children for the fights"); and proactive aggressive behaviours (3 items; i.e., "Threatens or hits other children", "Makes other children turn against one child", "Uses physical strength to dominate other children."). Parents rated on a 5-point scale (0 = (almost) never, 1 = rarely, 2 = sometimes, 3 = often, 4 = (almost) always). To obtain the reactive and proactive aggression scores, the average of the items belonging to each scale was calculated per child. The scores

obtained for each child were then standardised within each class (i.e., z-score calculation within classes). Due to the small number of items in the reactive and proactive aggression scales, inter-item correlations were considered as the measure for internal consistency (Clark & Watson, 1995). In both scales the mean inter-item correlations were within the ideal range (.39 for reactive aggression; .32 for proactive aggression), confirming coherence of the items in each scale and that each scale is attending to the specificity of each type of aggression. The Cronbach's alphas of both scales were within the acceptable range (.67 for proactive aggression; .60 for reactive aggression).

STATISTICAL ANALYSES

Considering that our data involves sociometric assessment, prior to data analysis we standardised the scores of all variables, as suggested by Coie and colleagues (1982). As there were classrooms with a hierarchical structure (a couple of children who are aggressive and most of the class shows no aggression) or with a more egalitarian distribution (everyone is equally aggressive), this preliminary step allowed us to attend to the specificity of each class, by comparing children with their peers, and not the overall sample.

To answer our first research question, bivariate correlations between the variables of our study, i.e., peer acceptance, reactive aggression, and proactive aggression, were conducted. To answer the second research question comparing the strength of correlations between each type of aggression and peer acceptance, the Meng's Z test (Meng et al., 1992), was used. Considering our hypotheses that the relation between peer acceptance and reactive aggression is stronger than that between peer acceptance and proactive aggression, we used one tailed testing to access significance. The Meng's Z-test in this study was conducted using R's (version 4.2.1) cocor package (version 1.1-4) (Diedenhofen & Musch, 2015). All the other statistical analyses were performed with the IBM SPSS (version 28). We analyzed mean differences between sexes of all variables using an independent sample t-test. Additionally, we explored the differences in the strength of the relation between both types of aggression and peer acceptance by conducting the Meng's Z-test for boys and girls separately. Possible sex differences in the

relation between each type of aggression and peer acceptance were analysed using the Fisher r-to-z transformations.

RESULTS

The range, mean and standard deviations of the raw and standardised scores of peer acceptance, reactive, and proactive aggression are reported in Table 1. Our correlation analyses (see Table 2 & Figure 1) to examine the relations between our variables yielded a positive relation between reactive and proactive aggression. As expected, peer acceptance was negatively related to reactive aggression, yet unrelated to proactive aggression. Comparison between the strength of correlations for each type of aggression and peer acceptance showed that the correlations of reactive and proactive aggression with peer acceptance did not differ ($z = -.95$; $p = .82$).

Table 1. Range, means and standard deviations of Peer Preference, Reactive and Proactive Aggression for the overall group, and separately by sex (raw score / standardized score - Z).

	Range Total (raw scores)		**Mean Total (SD)**		Mean Boys (SD)		Mean Girls (SD)	
	Min (% of children)	**Max (% of children)**	**Raw**	Z	Raw	Z	Raw	Z
Peer Preference	.31 (1%)	.71 (1%)	.52 (.09)	.07 (.92)	.51 (.09)	.04 (.93)	.53 (.09)	.11 (.93)
Reactive Aggression	.00 (13%)	3 (1%)	1.28 (.73)	.00 (.72)	1.47 (.67)	.20 (.63)	1.07 (.75)	-.23 (.75)
Proactive Aggression	.00 (54%)	2.33 (2%)	.34 (.50)	.00 (.75)	.49 (.59)	.19 (.84)	.17 (.30)	-.22 (.55)

Note. The scale scores have been standardized within classrooms.

Exploratory analyses regarding sex differences showed that boys and girls did not differ in their peer acceptance ($t(108) = -3.26$, $p = .87$), but differed in regards to reactive ($t(108) = .12$, $p = .001$) and proactive aggression ($t(99) = -.3.04$, $p = .003$). The positive relation between both types of aggression that was observed for the overall group was also found in both sexes. Furthermore, the relation between reactive aggression and peer

acceptance that we observed for the overall group, was not significant when calculated for boys and girls separately. Since no relation was found between both types of aggression and peer acceptance for girls and boys separately, the strength of these correlations was not compared. In addition to this, the Fisher r to z, revealed no sex differences regarding the strength of correlation between reactive aggression and peer acceptance (z = -.78; p = .22), and proactive aggression and peer acceptance (z = .04; p = .52).

Table 2. Correlations between Peer Preference, Reactive and Proactive Aggression for overall group (boys / girls).

	Peer Preference	Reactive Aggression
Reactive Aggression	-.18* (-.18 / -.18)	-
Proactive Aggression	-.08 (-.13 / .02)	.40*** (.38** / .33**)

*p < .05, **p < .01, ***p < .001,.

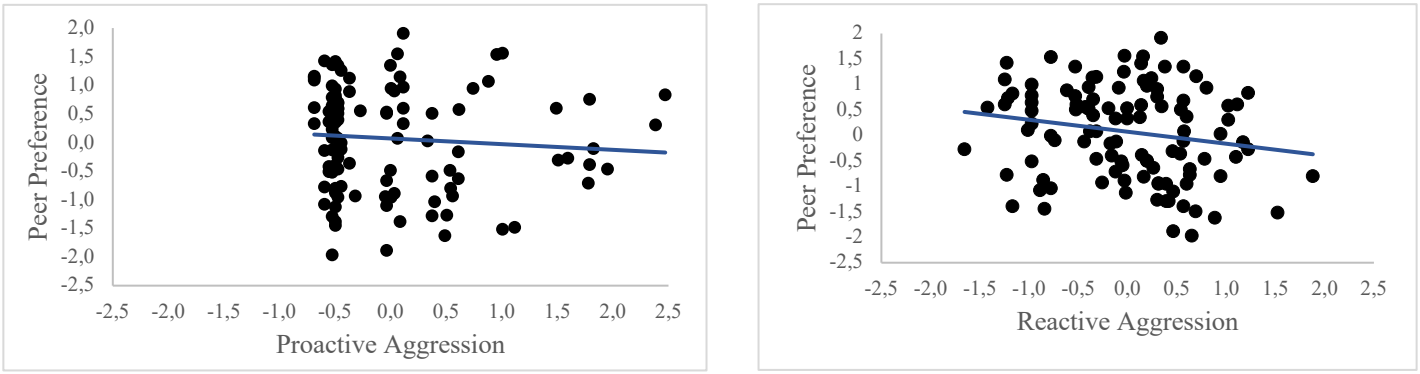

Figure 1. Scatter plots of the correlations between the standardized scores for Reactive and Proactive Aggression, and Peer Preference, for the overall group

DISCUSSION

Aggressive behaviours can negatively affect peer relations during preschool years (Endedijk et al., 2020; Sebanc, 2003; Stenseng et al., 2014), however, different

underlying mechanisms of aggressive behaviours might also affect peer relations differently. Consistent with previous studies in preschool children, the current study confirmed that, even at this age, aggressive behaviours can be distinguished regarding their reactive or proactive nature (Evans et al., 2018; Perry & Ostrov, 2018). Although several aspects of peer relations (e.g., victimization, rejection) have previously been studied regarding both types of aggression (Evans et al., 2018; Ostrov et al., 2014), this is the first study to focus on peer acceptance. Based on parent reports and peer nominations, our findings show that reactive aggression is related to preschoolers' peer acceptance, whilst proactive aggressive behaviours were rarely reported and unrelated to peer acceptance. Yet, the strength of the correlations between each type of aggression and peer acceptance did not differ in our sample. Exploratory analyses highlighted the negative relation between reactive aggression and peer acceptance was absent when considering boys and girls separately, and no sex differences appeared. These results were partially in line with our expectations and will be further discussed below.

Unlike outcomes based on studies in older children (Useche et al., 2014; Walcott et al., 2008), the expected relation for proactive aggression with peer acceptance was absent in our study. Note that proactive behaviours showed a low incidence. In fact, only 46% of parents noted at least one incidence of proactive aggression in their children, compared to 87% for reactive aggression. Although all studies on proactive and reactive aggression during preschool years show a much lower incidence of proactive aggression compared to reactive aggression, it might also be that preschoolers are not yet aware of the manipulative aspect that proactive aggression holds (e.g., helping them in gaining or maintaining status) (Jia, 2014; Murray-Close & Ostrov, 2009). In addition, parents may also be unlikely to see their own child as proactive aggressive, i.e., having manipulative or instrumental goals, which might thus result in the relatively low rates of reported proactive aggressive behaviours.

Our exploratory results regarding sex differences showed that boys had higher rates in both types of aggression compared to girls, which is in line with some previous research (McClain et al., 2022). However, these sex differences were not found to have an impact on the relation of peer acceptance with each type of aggression. As girls' aggressive behaviours tend to be more difficult to report (Ostrov & Keating, 2004), possibly girls' aggressive behaviour is underestimated. Typically, girls exhibit relational aggression which involves causing deliberate harm to others' social relationships, and the

way that they are perceived by others (Ostrov & Keating, 2004). Therefore, future studies focused on the relation between aggression and peer acceptance should use more comprehensive instruments to measure aggression, combining the type (physical versus relational), and the form (reactive versus proactive) when looking into sex differences of preschoolers.

The findings of this study shed light into the importance of early prevention of reactive aggressive behaviours, as they are already impacting social relationships starting as early as the preschool years. The current study has several strengths that should be highlighted.

Firstly, considering that peer acceptance is built upon the interactions between preschoolers, the use of computerised paired comparisons allowed us to rely on peers' perspective regarding their preferences, rather than those reported by teachers or caregivers, who may not fully grasp how preferences are underlying actual play behaviours. Moreover, this computerised assessment is appropriate for young children, since the task only involves comparisons between two pictures of peers, without demands on complex cognitive or language skills.

Furthermore, our results provide guidance for intervention in the preschool setting that might aid children's SIP. As previously mentioned, reactive aggression stems from issues in encoding and interpreting of social situations (steps i & ii), that are interrelated with difficulties emotional processing, namely emotional understanding and emotional regulation (Crick & Dodge, 1996; De Castro et al., 2005). Therefore, it could be essential at this young age to opt for interventions that are focused on body awareness (i.e., understanding the body cues that signal an increased anger arousal) and self-regulation, in order to attend to the specific difficulties of emotional processing that reactive aggressive children are negatively impacting their ability to process social information properly. For example, body-oriented interventions have been shown to positively contribute to preschoolers' emotional processing (Dias Rodrigues et al., 2022). Within the scope of body-oriented interventions, interventions that combine play and relaxation aid children to promote their self-regulation skills (Dias Rodrigues et al., 2023; Veiga et al., 2023). Furthermore, recreating scenarios that are encountered in their daily lives, and reinforcing problem-solving skills, may allow teachers/practitioners to improve children's ability to perceive situations (steps i & ii) in a less hostile way and contribute

to remainder of the SIP steps (Verhoef et al., 2022). Therefore, promoting these interventions in the preschool setting might contribute to reducing the prevalence of reactive aggressive behaviour in this age group, which future studies could further explore.

Finally, our findings create a baseline for future studies focusing on more complex theoretical models and approaches. For example, recent studies have confirmed that teacher-child relationship mediates certain aspects of peer relationships (Longobardi et al., 2021; Prino et al., 2023; Sette et al., 2013), especially children who have behavioural problems (see Endedijk et al., 2022, for a review). Children spend most of their time under the care of their teachers, and their peer responses are modelled by mimicking how teachers respond to their peers (Schaefer Whitby et al., 2012). When teachers expose these children to regulated models, children acquire these positive models as their own (Schaefer Whitby et al., 2012). When conflicts arise, teachers can help children to navigate through the situation by promoting changes in children's encoding and interpretation (steps i & ii), by helping children to evaluate the initial situation, how they felt about it, what their perception was, and why they reacted in a certain way (Crick & Dodge, 1996; De Castro et al., 2005; Verhoef et al., 2022). As behavioural responses are largely influenced by the social repertoire that children have, while guiding them on reevaluating their responses to peers, encouraging perspective taking and problem-solving skills that children can internalise alternative ways to respond to future social conflicts, rather than automatising reactive aggressive patterns (Verhoef et al., 2022). Therefore, future studies should consider the role of the teachers on the peer acceptance of reactive/proactive aggressive children. The potential of these studies is not only to make teachers more aware of their importance, but it is also crucial to provide them with tools to facilitate relationships with children when challenges arise (e.g., Dias Rodrigues et al., 2023; Veiga et al., 2023), so that dysfunctional patterns are not repeated in daily interactions between peers.

Although this study gave new insights into children's aggressive behaviours and peer relations in the preschool years, the use of only parent reports is a limitation. The present results should be taken with caution, as the strength of the correlations could have been influenced by a low power due to our sample size. Future studies should aim to include teachers' perspectives to assess reactive and proactive aggression. A second limitation is related to the cross-sectional nature of this study that prevent us from drawing

conclusions about the possible impact of each type of aggression on peer acceptance across the preschool years. Finally, future studies would largely benefit from also including observational measures (e.g., free play interactions) that provide additional valuable information regarding the manifestation of proactive/reactive aggressive behaviours towards peers in the preschoolers' natural environment (e.g., on the playground).

In conclusion, although both types of aggression, reactive and proactive, showed a rather low prevalence at the preschool age, our outcomes also highlighted that reactive aggression is negatively associated with children's peer relations already in preschool age. As a final note, we suggest multi-method and multi-informant measurements for a complete assessment of proactive and reactive aggression during preschool years, as well as conducting longitudinal and experimental studies to further improve our understanding of the links between various forms of aggressive behaviours and development of peer relationship.

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Chapter 7

Moral emotions in early childhood The relation

Validation of the Moral Emotions Questionnaire (MEQ)

Da Silva, B.M.S., Ketelaar, L., Veiga, G., Tsou, Y.T., & Rieffe, C. (2022). Moral emotions in early childhood: Validation of the Moral Emotions Questionnaire (MEQ). *International Journal of Behavioral Development*, 46(2), 157-168. https://doi-org /10.1177/01650254221075031

ABSTRACT

Moral emotions are experienced in daily life and are crucial for mediating appropriate social behaviours, as they prevent individuals from committing transgressions. In this study, caregivers of 377 children aged between 2.5 and 6.5 years old completed the Moral Emotions Questionnaire (MEQ), a parent report aimed to separately identify the presence of shame, guilt, and pride behaviours in early childhood. To validate this newly developed questionnaire, a confirmatory factor analysis and measurement invariance were conducted, and internal consistency, and concurrent validity were tested. Outcomes confirmed that the three moral emotions can be individually identified through the MEQ, even at such an early age. The MEQ scales showed acceptable internal consistencies and the associations between the three moral emotions and externalizing behaviours, internalizing behaviours, and social competence were in accordance with previous research, therefore confirming concurrent validity.

INTRODUCTION

Moral emotions arise when people feel judged, or expect to be judged by others, or judge their own behaviour in terms of right and wrong. Within the spectrum of moral emotions, shame, guilt, and pride, are considered self-conscious emotions. Self-conscious emotions are those which require a self-evaluative process, in which the individual continuously evolves according to the social norms (Sznycer, 2019; Tracy & Robins, 2004a). The experience—or even just the anticipation—of these emotions serves as a behaviour regulation mechanism, urging people to abide by the rules and to avoid committing moral transgressions (Blasi, 1999; Tangney et al., 2007). Moral emotions also serve a communicative function: when people express moral emotions, they openly acknowledge that their behaviour was incongruent (as in guilt or in shame) or congruent (as in pride) with the group's rules, norms, and values, and that they take responsibility for their behaviour. This helps them to be accepted—or reaccepted—as a valuable group member (Shariff & Tracy, 2011; Stearns & Parrott, 2012).

Shame, guilt, and pride have been appointed as the more focal self-conscious emotions, their development and relation with other aspects of psychosocial functioning have long been studied (Sznycer, 2019; Tracy & Robins, 2004a). Lower levels of moral emotions have been associated with externalizing behaviours (e.g., bullying, aggression, delinquency, psychopathy) in early adolescence and adulthood (Blair et al., 2001; Holmqvist, 2008; Menesini & Camodeca, 2008; Olthof, 2012). These findings point to the importance of examining the development of moral emotions at the youngest possible age.

Moral understanding and morally guided behaviours can be observed early in life. For example, 2-year-old children are able to stop themselves from doing something that is prohibited, and then also hesitate after disobeying a rule (Kochanska & Aksan, 2006). Studies have confirmed that children as young as 2 or 3 years old already show behaviours that suggest the experience of moral emotions, such as signs of distress, avoiding eye contact, confessions, and/or reparative behaviours after a transgression (Barrett et al., 1993; Kochanska et al., 1995), as well as behaviours that suggest an attempt to attract attention when they achieved something on their own (Stipek et al., 1992). This is in line with the development of self-concept, which has been suggested to emerge around the 30 months of age (Bullock & Lutkenhaus, 1990). The development of moral emotions

accompanies self-concept development, because to be able to evaluate whether their actions are congruent or incongruent with societal norms and values, children first need to be able to distinguish themselves from others and then focus the attention on their individual actions (Hart & Matsuba, 2007). This learning process, which seems to be a major importance on the first 4 years of life, occurs through the daily interactions that children have (Dahl & Killen, 2018a, 2018b). Since they are born, children experience and observe behaviours of aid and harm from their families toward them, and also between other people (Dahl, 2015; Hammond et al., 2017). These experiences help them shape their knowledge about right and wrong, and together with a constant development of their self-concept, allow them to guide their behaviours toward others (Dahl & Killen, 2018a, 2018b). To the best of our knowledge, no instrument is yet available that can facilitate the systematic study of the different moral emotions in the preschool years, when children first show signs of these emotions. Therefore, our aim was to develop and validate a questionnaire that can uniquely identify different moral emotions (shame, guilt, and pride) in early childhood.

DISTINGUISHING MORAL EMOTIONS

Different moral emotions can be distinguished according to their associated social goals and behaviours. Shame and guilt could both arise from the same antecedent, namely, when a transgression is committed. In fact, the same transgression can evoke shame in one person and guilt in another (Lewis, 2014; Tangney et al., 2007). Shame arises when a transgressor thinks that the harm is irreparable, as it reflects a failure of the whole self, and/or that others will attribute to him or her a negative, unwanted identity (Barrett et al., 1993; Olthof, 2012). Shame can be observed through submissive behaviours (e.g., making oneself appear smaller, avoiding eye contact) and the avoidance of others' attention by the transgressor. Although the action tendencies of trying to avoid the attention after children commit transgressions or cause harm to others are reported to already be exhibited by 2-year-old children (Barrett et al., 1993), research suggests that shame emerges after age 3, when children become more aware of themselves, and their behaviours in relation to social norms and rules (Kagan, 2005; Lewis, 1998). Shame prevents the individual from acting against social norms, thereby preventing negative judgment from others (Barrett, 1998a; Bedford & Hwang, 2003; Cole et al., 2006;

Dempsey, 2017; Fung, 1999; Midlarsky et al., 2006; Yoshioka & Choi, 2005). Previous studies have shown that in older children, adolescents, and adults, excessive shame often leads to increased levels of anger and to persistent feelings of inferiority or failure, which can contribute to anxiety and depression (Bennett et al., 2005; Broekhof et al., 2018; Harper & Arias, 2004; Tangney et al., 2007).

In contrast, guilt arises if the transgressor has a sense of responsibility over the transgression. In this case, the damage only reflects his or her behaviour in this specific situation and not in relation to the whole self (Barrett et al., 1993; Ferguson et al., 2000; Tracy & Robins, 2004a). Guilt elicits a need to repair harm done and restore the relationship. Thus, guilt serves as a prosocial behaviour motivator (Dempsey, 2017). Guilt behaviours are usually aimed at drawing attention to the wrongdoing and trying to make up for it, as in confessing, making apologies, or trying to repair the damage (Tangney et al., 2007). A study conducted by Zahn-Waxler et al. (1992) has shown that action tendencies related to guilt start to manifest in children as young as 15 months of age, with children showing intent to repair the harm they caused to others. However, most studies report that these reparative behaviours became more prominent after 2 years of age (Barrett, 1998b; Cole et al., 1992; Kochanska et al., 1994, 2002), suggesting that guilt is developed throughout the second year of life. Previous studies have shown that children who more frequently experience guilt are more attentive and competent when dealing with others, show more prosocial behaviours, and have better quality friendships and relationships (Baumeister et al., 1994; Estrada-Hollenbeck & Heatherton, 1995; Kochanska & Aksan, 2006). Conversely, children who show fewer guilt behaviours tend to exhibit more disruptive behaviours and show more aggression and conduct problems, which may negatively affect their social relationships (Frick & Morris, 2004; Kochanska & Aksan, 2006).

Pride arises when one feels responsible for accomplishing something that exceeds the expectations of others in a positive way, while also feeling internally positive about oneself (Orth et al., 2010; Tracy & Robins, 2004b, 2007). Pride may play an important role when establishing and maintaining social interactions with peers, as it not only promotes the value of one person in the eyes of others (Mauro et al., 1992), but is also internally rewarding to the individual. As such, it motivates one to act according to social norms to feel valued by others (Cheng et al., 2010; Sznycer et al., 2017, 2018; Williams & DeSteno, 2008). The behavioural components of pride (e.g., head held high, making

eye contact) are aimed at attracting attention from significant others. Still, in this case, the attention is focused on oneself or one's accomplishment (Tracy & Robins, 2004b). Children, who are 2 years of age, already manifest action tendencies related to pride, like calling for attention after achieving something by themselves (Hart & Matsuba, 2007; Stipek et al., 1992), which continuously developed throughout childhood. Previous studies have shown that pride increases children's confidence in initiating interactions and resolving conflicts (Cheng et al., 2010; Mauro et al., 1992; Sznycer et al., 2017, 2018; Williams & DeSteno, 2008).

ASSESSMENT OF MORAL EMOTIONS IN EARLY CHILDHOOD

To date, not many instruments for measuring moral emotions in early childhood are available, despite the crucial role of moral emotions in the development of psychosocial functioning. Observational studies that measure responses to emotion-evoking events are the most commonly used method for assessing moral emotions in young children. In these studies, children are instructed to complete tasks that are either designed to allow them to succeed or to set them up to fail (Belsky et al., 1997; Kelley et al., 2000; Ketelaar et al., 2015). Observing children in staged situations or in field observations is very informative, but can be time consuming. Questionnaires allow researchers to obtain information from a large number of participants in a short amount of time. Moreover, given that young children spend a lot of time in the vicinity of their parents, parents can be a valuable source of information about their child's moral behaviours across a variety of settings and situations with different people.

To the best of our knowledge, the only questionnaire to date that focuses on young children's moral emotions is "The Conscience Measure Questionnaire" (also referred to as the "My Child" measure) by Kochanska et al. (1994). The "My Child" questionnaire is a parental report on children's awareness of wrongdoing and their willingness to stop or repair an incorrect behaviour (Kochanska et al., 1994). However, the "My Child" questionnaire does not capture pride, and seems mostly oriented toward guilt, not shame. Therefore, we aimed to develop a new parent report questionnaire addressing the three major moral emotions (i.e., guilt, shame, pride) in young children, while focusing on behavioural indices related to each emotion separately.

CURRENT STUDY

The development of moral emotions is crucial for psychosocial development, with shame, guilt, and pride being related to distinct outcomes regarding externalizing and internalizing symptoms and social competence. However, no instruments that distinguish between these three moral emotions for children at their emergent age have been developed. Therefore, this study aimed to establish the factor structure, internal consistency, and validity of a newly developed parent report questionnaire for assessing shame, guilt, and pride in young children: the Moral Emotions Questionnaire (MEQ).

First, we examined whether the hypothesized three-factor structure of the MEQ was confirmed (shame, guilt, and pride) by conducting a confirmatory factor analysis (CFA). Second, we examined the internal consistencies of the individual scales from the MEQ. The third aim of this study was to establish the concurrent validity of the MEQ by examining relations with other aspects of social–emotional functioning (i.e., internalizing behaviours, externalizing behaviours, and social competence). Finally, measurement invariance was assessed across gender, and two age groups (under 4 years of age and 4 or older) to verify whether the responses of caregivers to the items were equivalent considering those factors.

In this questionnaire, shame is operationalized as the tendency to show submissive behaviour or to withdraw or escape from a situation. Based on the literature, we hypothesized that higher levels of shame would be associated with higher levels of internalizing and externalizing problems (Ferguson et al., 1999; Tangney et al., 1992, 2014; Thomaes et al., 2011). Guilt was operationalized as an other-oriented, adaptive emotion. This emotion is associated with the urge to confess, apologize for, or repair a wrongdoing as a sign of remorse. Therefore, guilt was expected to be positively related to social competence and negatively related to externalizing problems (Ferguson et al., 1999; Roos et al., 2014; Stuewig et al., 2010; Tangney et al., 1996). Pride is operationalized as a tendency to draw the attention of others toward an individual accomplishment, and exhibit enjoyment in regards to others' appraisals of oneself. Based on literature, behavioural indices for pride were expected to be associated with higher levels of social competence (Hooge et al., 2011; Kluwin et al., 2002; Mascolo & Fischer, 1995).

METHOD

Participants and Procedure

Caregivers of a total of 377 children aged between 2.5 and 6.5 years old (mean age = 54 months, SD = 13 months; 55% of boys) participated in the study. Mothers completed the questionnaire for 301 children; fathers completed the questionnaire for 37 children; for 11 children, both parents completed the questionnaires together; and for another 11 children, the questionnaire was completed by other caregivers. Mothers aged between 25 and 47 years old (mean age = 37 years, SD = 4 years), while fathers aged between 24 and 61 years old (mean age = 39, SD = 6 years). Concerning the socioeconomic status of the participating families, 22% did not report this information. From the families who replied the majority belonged to the middle level of socioeconomic status (44%), followed by families in the high level of economic status (25%), and finally by families with low economic status (9%). The participants were recruited via daycare centres, preschools, and elementary schools in the Netherlands. Children were excluded from the study if they had any apparent developmental delays or mental health disorders, such as attention-deficit hyperactivity disorder (ADHD) or autism spectrum disorders. Parents were informed about the goals and execution of the study, how data were to be handled and stored to guarantee their privacy, and about the voluntary nature of their participation. All parents provided written consent to participate in the study. Parents filled in the questionnaires either on paper or via a website.

Outcome Variables and Materials

Moral Emotions Questionnaire

The MEQ (Table 1) aims to assess behavioural responses associated with three distinct moral emotions: shame (eight items), guilt (eight items), and pride (nine items). This initial 25-item version of the MEQ was developed by a team of developmental psychologists and psychology students, some of whom had children within the intended age range, in a multi-step procedure.

Table 1. Items of the Moral Emotions Questionnaire, MEQ

Shame	
1	My child hides when he/she has done something wrong
4	When my child has done something wrong, he/she does not look at me
7	When my child thinks he/she has done something stupid, he/she hits him-/herself
9	My child quickly walks away when he/she has done something he/she is not allowed to do
12	When my child does something wrong he/she makes a negative comment about him-/herself (e.g., "I am stupid")
16	My child gets upset when he/she has done something wrong
17	When my child has broken something, he/she tries to hide it from me
20	My child is afraid of making mistakes
Guilt	
3	When my child does something he/she is not allowed to do, he/she tries to make up for it (e.g., saying sorry)
6	My child shows that he/she regrets something
10	My child comes to me when he/she has broken something
13	When my child has broken something of someone else, he/she tries to repair it
18	My child cries when he/she has accidentally hurt someone
21	When my child does something wrong (e.g., spill something), he/she tries to fix it (e.g., fetches a cloth)
23	My child does not respond when I scold him/her for doing something he/she is now allowed to do (R)
24	When my child breaks something of someone else, he/she wants to make up for it
Pride	
2	When my child has done something remarkable, he/she comes over to show me
5	When my child has done something remarkable, I can tell that he/she is happy about it
8	When he/she has accomplished something difficult, my child looks at me
11	When my child receives a compliment, he/she smiles
14	My child tries to do well
15	My child wants me to come over and take a look when he/she has accomplished something difficult.
19	My child does not respond when I praise him/her for accomplishing something difficult (R)
22	My child likes receiving compliments
25	When my child has done something well, he/she says something positive about him-/herself

Note: (R) denotes a reverse scored item.

In Step 1, each member of the team formulated items to measure guilt, shame, and/or pride, based on their experience with young children, their knowledge of the literature on moral emotions, and their experience with conducting observational studies on moral emotions.

In Step 2, the combined list of items was discussed in the team, and inappropriate items were deleted (e.g., only suitable for older children, not involving observable behaviour, or overlapping content with other items) or revised (e.g., when an item was not specific enough). At this stage, 25 items passed this selection.

In Step 3, parents of 106 children were asked to fill out the first version of the MEQ consisting of 25 items, and additional questionnaires. Parents rated the degree to which each item represented their child's behaviour in the last 2 months on a 3-point scale (0 = never, 1 = sometimes, and 2 = often). For these parents, an extra response category for "not applicable" (NA) was available. Parents were instructed to choose this option only when their child had not been in that particular situation in the past 2 months. Frequencies of the response categories based on these first 106 participants showed that, for any of the items, no more than 25% of the parents had selected the option NA, and for 21 out of 25 items, this option was selected by less than 10% of parents.

In Step 4, based on the low use of the category NA, this response category was now removed from the questionnaire. No items were revised or removed at this stage. The questionnaire was now administered to another 271 parents, who were instructed to answer all items by selecting one response from the following options: "never," "sometimes," or "often."

In Step 5, data from Steps 3 (n = 106) and 4 (n = 271) were analysed collectively to examine the psychometric properties of the MEQ (variance, factor structure, internal consistency, and inter-item correlation). NA answers were analysed in two ways: recoded as 0 and recoded as missing values. Both methods of data analyses showed similar outcomes. Therefore, in the final data analyses, NA answers from the first sample of 106 parents were recoded into 0 because, most likely, parents who did not have the NA option would have opted for "never" when their child had not been in that particular situation.

Internalizing and Externalizing Behaviors

To obtain information about the prevalence of internalizing and externalizing behaviours, the Early Childhood Inventory-4 (ECI-4; Sprafkin et al., 2002) parent checklist was used. This checklist measures the behavioural symptoms of the most prevalent disorders in the Diagnostic and Statistical Manual of Mental Disorders (4th ed.; DSM-IV) among preschool children. The ECI-4 parent checklist contains 108 items that screen for 15 emotional and behavioural disorders. Parents rated the extent to which their child showed each behaviour on a 4-point scale (0 = never, 1 = sometimes, 2 = often, and 3 = very often).

For the scale for internalizing behaviours (25 items), we combined items that belonged to the following scales: major depressive disorder (10 items), separation anxiety (8 items), social phobia (3 items), and generalized anxiety (4 items).

For the scale for externalizing behaviours (18 items), we combined items belonging to the oppositional defiant disorder (8 items) and conduct disorder (10 items) scales.

The psychometric properties of these scales are shown in Table 2. The internalizing and externalizing behaviour scales showed good reliability with Cronbach's alpha values of .77 and .80, respectively. The inter-item correlation of the internalizing behaviours scale (.13) was lower than desired, but close to acceptable values, and the value for the externalizing behaviours scale was acceptable (.18).

Table 2. Internal Consistencies of the indices for internalizing behaviours, externalizing behaviours and social competence

	No. items	n	Mean (SD)	Cronbach's Alpha [95% CI]	Inter-item correlation (range)
Internalizing Behaviors[1]	25	278	.27 (.16)	.77 [.72, .80]	.13 (.62)
Externalizing Behaviors[1]	18	284	.29 (.20)	.80 [.77, .83]	.18 (.69)
Social Competence[2]	7	291	1.56 (.31)	.64 [.57, .70]	.20 (.32)

Note. [1]4-point scale (0 = never, 1 = sometimes, 2 = often, 3 = very often). [2] 3-point scale (0 = not true, 1= somewhat true, 2 = certainly true)

Social Competence

To obtain information about social competence, we followed the procedure of Veiga et al. (2017) and used the prosocial behaviours scale, and positive items from the peer problems scale in the Strengths and Difficulties Questionnaire (SDQ; Goodman, 1997; Muri et al., 2003). The SDQ was administered to parents, who were asked about their child's peer relationships (two items; i.e., "Has at least one good friend," "Generally liked by other children"); and prosocial behaviour (five items). Parents rated on a 3-point scale (0 = not true, 1 = somewhat true, and 2 = certainly true), the degree to which each item represented their child's behaviour in the last 3 months. As reported in Table 2, this scale showed acceptable reliability with Cronbach's alpha value of .64, the inter-item correlation value was also acceptable (.20).

STATISTICAL ANALYSES

First, to assess construct validity, we conducted a CFA, where the proposed 25-item measurement model (Table 1) was tested. Due to non-normality of the data, the CFA was performed with maximum likelihood estimation with Satorra & Bentler's (1994) correction, to safeguard against deviations. Goodness of fit of the model was evaluated using the root mean square error of approximation (RMSEA < .06; Hu & Bentler, 1999),

the comparative fit index (CFI > .90; Bollen, 1989), and the standardized root mean square residual (SRMR < .08; Little, 2013). Furthermore, the value for the Akaike information criterion (AIC) was also used for comparison between the models. The AIC does not have an absolute norm. When comparing between models, the lower AIC value indicated the better fit (Pho et al., 2019).

To evaluate whether measurement properties of the MEQ were invariant across genders and age groups (under 4 years of age and 4 or older), a multigroup CFA was conducted. Following the procedure suggested by Milfont and Fischer (2010), testing three levels of measurement invariance sequentially: configural, metric, and scalar. Configural invariance is meant to confirm whether the model in equivalent for the groups that are being compared. In this step, the model structure in both genders and age groups was analysed without any constraints. Metric invariance is meant to confirm whether the meaning of the items of the scale is similar for the groups being compared. In this step, the model structure in both genders and age groups was analysed constraining all the factor loadings. In the case that metric invariance was not met, partial invariance was analysed, after freeing the invariant items (Byrne et al., 1989). If metric (partial) invariance is met, scalar invariance can be tested, which allows to confirm that members of each group being compared are rated similarly when using the scale. In this step, the model structure in both genders and age groups was analysed constraining the item intercepts. To test the metric and scalar invariance, three model fit indices variations were considered: the decrease of the CFI value should not be more than .01 in comparison to the previous model; the variation of the RMSEA between models should be less than .015; and the variation of the SRMR between models should be less than .030 (Chen, 2007; Cheung & Rensvold, 2002). Items to be freed for partial invariance analyses were chosen based on their univariate modification indices, and also on the Lagrange multiplier test. This test shows the effect of releasing an equality constraint simultaneously between groups (Martín-Puga et al., 2020; Rosseel, 2012). Gender and age group differences were assessed if at least 50% of the items comprising a given factor were invariant (Steenkamp & Baumgartner, 1998; Vandenberg & Lance, 2000). As significant correlations were found between age and the scale guilt ($r = .18$; $p < .05$) and also with the scale pride ($r = .15$; $p < .05$), further analyses were conducted with partial correlations corrected for age.

Second, considering the ordered categorical nature of the items, we assessed the internal consistencies of the obtained MEQ scales using McDonald's omega and inter-

item correlations (Crutzen & Peters, 2017). Third, Pearson's correlations (with Bonferroni correction for multiple comparisons) with the internalizing and externalizing behaviours of the ECI-4, and the social competence scale of the SDQ, were conducted to examine concurrent validity. Prior inspection to the scatterplots of the associations between the three moral emotions and the concurrent measures, indicated only linear trends, therefore, only linear associations were studied. The CFA in this study was conducted using R's (version 4.0.2) lavaan package (version 0.6-6; Rosseel, 2012); and the lavTestScore function of the same package was used to conduct the Lagrange multiplier test. All the other statistical analyses were performed with the IBM SPSS (version 21).

RESULTS

Confirmatory Factor Analysis

Items on the MEQ that were negatively formulated (see Table 1) were reverse coded, so that, higher scores represented more expression of the moral emotion. The original 25-item MEQ (Table 1) was fitted with the hypothesized three-factor structure and yielded a poor fit (Model 1 in Table 3). To improve model fit, factor loadings and modification indices were analysed. That is, items with low factor loadings (< .30), and high modification indices (> 10) were further analysed in terms of their content. The content of each item was considered before exclusion, so that, any deletion was not solely based on statistical outcomes, but also on the theoretical appropriateness of the item on the intended factor. Items who showed conceptual overlap with another scale or concept were removed. This procedure resulted in the deletion of six items (7, 20, 12, 19r, 5, and 16) and resulted in Model 2. Although this model showed an improved fit, two more items were removed resulting in Model 3 (Figure 1): Item 10 was excluded due to high loading on the non-intended factor; Item 24 was removed due to theoretical overlap with Item 13. The values for goodness of fit for the final model (Model 3) showed appropriate levels. The SRMR and the RMSEA were below the desired cut-off points. The AIC of Model 3 was the lowest, therefore indicating a better fit. Although the CFI did not reach the cut-off point of > .90, our CFI value (.871) was within the acceptable range, given that the RMSEA of the null model value for Model 3 was .119 (Veiga et al., 2019). The CFI is a comparative index that ranges from 0 to 1, in which the proposed model is compared to a null model wherein all measured variables are uncorrelated. The null model should have a poor fit, with a very large chi square (Ching et al., 2014). Kenny et al. (2014) have suggested that if the value of the RMSEA of the null model is < .158, the CFI is less informative. Thus, a threshold of > .90 could be too strict for our model. Correlations between error terms of items were analysed. No significant correlations were found, indicating that there was no overlap between items from different latent variables.

Table 3. Results of the confirmatory factor analysis

	$\chi 2$	*df*	RMSEA [90% CI]	CFI	Null RMSEA	SRMR	AIC
Model 1	656.28*	272	.065 [.059, .072]	.687	.124	.079	12868.49
Model 2	323.74*	149	.059 [.050, .068]	.805	.126	.066	10378.46
Model 3	198.30*	116	.046 [.035, .056]	.871	.119	.056	9074.00

Note. N = 377. * p <.001

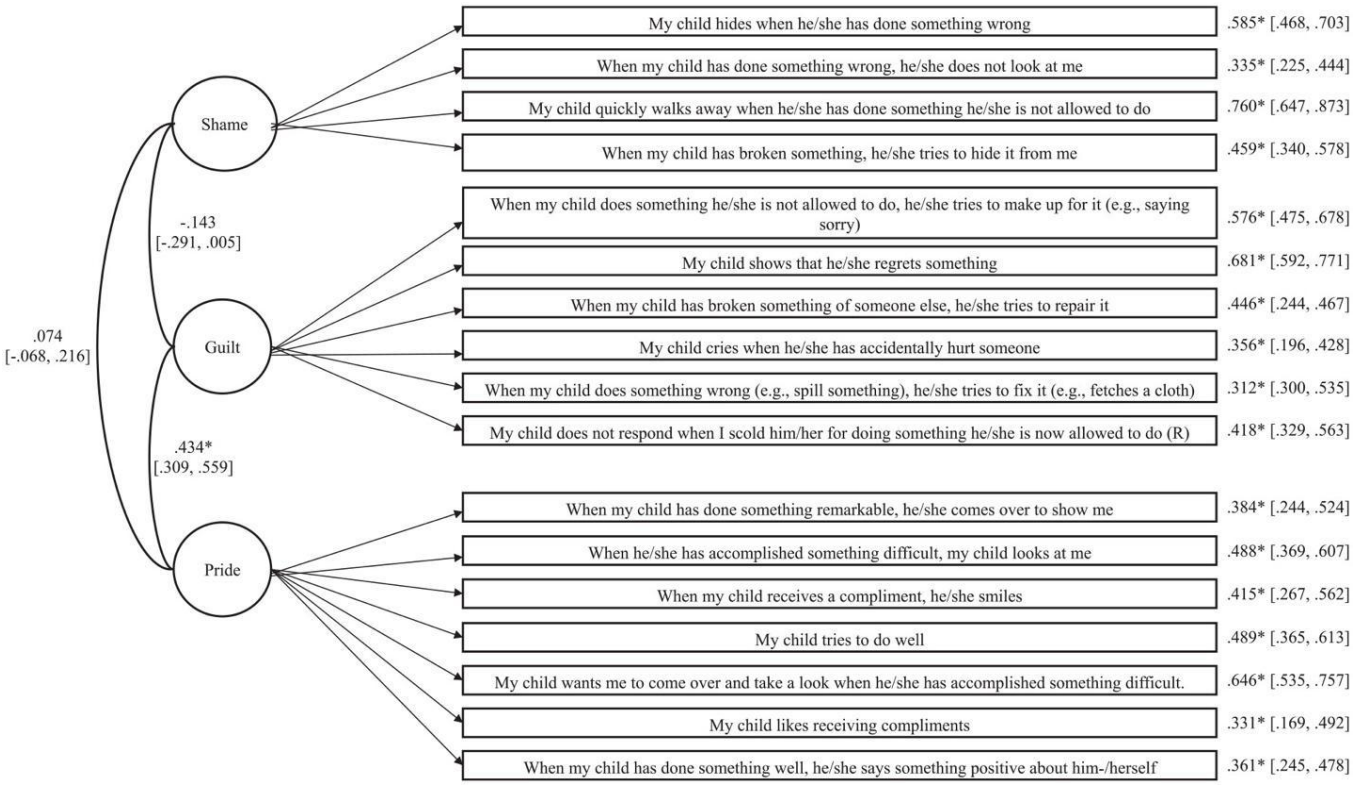

Figure 1. CFA of the Three-Factor Structure of the MEQ.

Measurement Invariance Across Gender

To test the invariance of the model across gender, a multigroup CFA was performed to the final model (Table 4). First, the fit statistics obtained from the configural (baseline) model showed an acceptable fit, $\chi 2$ (232, N = 306) = 296.162, $p < .01$; CFI = .891; RMSEA = .040; SRMR = .065. In the next step, the testing of the metric invariance showed a significant change in the model fit (ΔCFI = −.020; ΔRMSEA = .003; ΔSRMR = .007), indicating that the model was variant across genders, and metric invariance could not be assumed. Partial metric invariance was then tested by freeing the constraint on Item 11, and a nonsignificant change in the model fit was obtained, as compared to the configural model (ΔCFI = .005; ΔRMSEA = −.002; ΔSRMR = .004). This indicates that except for Item 11, the factor loadings were invariant across genders, and partial metric invariance could be assumed. Next, the testing of the scalar invariance showed a significant change in the model fit (ΔCFI = −.052; ΔRMSEA = .008; ΔSRMR = .004). After freeing the equality constraints on the intercepts of Items 15 and 18, partial scalar invariance could be achieved (ΔCFI = .002; ΔRMSEA = −.001; ΔSRMR = .001).

Table 4. Fit indices for measurement invariance across gender and age group (<4yo : ≥4yo).

	Model fit indices						Model fit differences		
Parameter	χ^2	*df*	CFI	RMSEA [90% CI]	Null RMSEA	SRMR	ΔCFI	ΔRMSEA	ΔSRMR
Gender									
Configural	296.142*	232	.891	.040 [.025, .054]	.117	.065			
Metric	321.816*	246	.871	.043 [.028, .055]	.117	.072	-.020	.003	.007
Partial Metric[1]	305.620*	245	.896	.038 [.022, .052]	.117	.069	.005	-.002	.004
Scalar[1]	351.840*	259	.844	.046 [.033, .057]	.117	.073	-.052	.008	.004
Partial Scalar[1,2]	316.327*	256	.898	.037 [.021, .050]	.117	.070	.002	-.001	.001
Age Group									
Configural	316.517*	232	.869	.046 [.033, .059]	.121	.065			
Metric	326.208*	246	.874	.044 [.030, .056]	.121	.068	.005	-.002	.003
Scalar	423.264*	260	.753	.060 [.050, .070]	.121	.076	-.121	.016	.008
Partial Scalar[3]	341.172*	255	.866	.045 [.031, .057]	.121	.069	-.008	.001	.001

Note. N = 377. * p <.01

[1] Equality constraint on the factor loading of item 11 was freed from the model.

[2] Equality constraints on the intercepts of items 11, 15, and 18 were freed from the model.

[3] Equality constraints on the intercepts of items 8, 9, 14, 17, and 23 were freed from the model.

Because partial scalar invariance could be assumed, and more than 50% of the items for each factor were invariant, the means of the two gender groups can be compared for the three moral emotions. As shown in Table 6, caregivers of boys acknowledged their children to show less guilt, t(375) = −2.75, p = .006, and pride, t(373) = −4.17, p < .001, compared to girls. An additional inspection on the latent means showed that boys and girls differed in pride, E(girls–boys) = .074 (Var(girls–boys) = 0.022); p = .001, but not in guilt and shame.

Measurement Invariance Across Age Groups

To test the invariance of the model across age groups, a multigroup CFA was performed to the final model (Table 4), with one group comprising participant younger than 4 years of age, and the other group comprising participants who were 4 years or older. First, the fit statistics obtained from the configural (baseline) model showed an acceptable fit, $\chi 2$ (264, N = 306) = 316.517, p < .001; CFI = .869; RMSEA = .046; SRMR = .065. In the next step, the testing of the metric invariance showed a nonsignificant change in the model fit (ΔCFI = .005; ΔRMSEA = −.002; ΔSRMR = .003), indicating that the model was invariant across the two age groups, and metric invariance could be assumed. Next, the testing of the scalar invariance showed a significant change in the model fit (ΔCFI =−.121; ΔRMSEA = .016; ΔSRMR = .008). Further analyses indicated that the equality constraints on the intercepts of Items 8, 9, 14, 17, and 23 should be freed, and partial scalar invariance could be achieved afterwards (ΔCFI = −.008; ΔRMSEA = .001; ΔSRMR = .001).

The assumption of partial scalar invariance (with at least 50% of the items for each factor were invariant) allows the means of the two age groups to be compared for the three moral emotions. As shown in Table 6, caregivers of the children younger than 4 years of age acknowledged their children to show less guilt, t(375) = −2.77, p = .006, and pride, t(220) = −2.83, p = .005, compared to children who are 4 years or older. An additional inspection on the latent means also showed that children younger than 4 years of age and children who were 4 years or older, differed in guilt $E_{(\geqslant 4\,\mathrm{yo} - < 4\,\mathrm{yo})} = .153$ ($\mathrm{Var}_{(\geqslant 4\,\mathrm{yo} - < 4\mathrm{yo})} = .046$); $p = .001$, and pride, $E_{(\geqslant 4\,\mathrm{yo} - < 4\,\mathrm{yo})} = .040$ ($\mathrm{Var}_{(\geqslant 4\,\mathrm{yo} - < 4\,\mathrm{yo})} = .020$); $p = .043$, but not in shame.

Reliability

Table 5 shows partial correlations corrected for age between the MEQ scales. Guilt was positively associated with pride, yet not to a degree that suggests collinearity. No other significant correlations between the MEQ scales were found.

Table 5. Correlations between indices for moral emotions (corrected for age)

	1	2	3
1. MEQ-Shame	-	-.13*	.03
2. MEQ-Guilt		-	.27***
3. MEQ-Pride			-

Note. MEQ: Moral Emotions Questionnaire. N = 377. * $p < .05$; ** $p <.01$.; *** $p <.006$ (after Bonferroni correction)

McDonald's omega and inter-item correlation coefficients for the three MEQ scales are reported in Table 6. The outcomes show that the internal consistency per scale is acceptable for shame (.62), guilt (.62), and pride (.63).

Table 6. Mean total, and mean by age category, and internal consistencies of the Moral Emotions Questionnaire (MEQ) scales

	N items	ω	IIC (range)	Mean (SD)	Age group comparison				Gender group comparison			
					< 4yo, mean (SD)	≥ 4yo, mean (SD)	95% CI of differences	*d*	Boys, mean (SD)	Girls, mean (SD)	95% CI of differences	*d*
Shame	4	.62	.28 (.37)	.61 (.40)	.55 (.37)	.63 (.42)	[-.16, .01]	.00	.61 (.41)	.61 (.40)	[-.08, .08]	.02
Guilt *	6	.62	.21 (.37)	1.22 (.35)	1.15 (.35)	1.25 (.35)	[-.18, -.03]*	.03	1.17 (.34)	1.27 (.36)	[-.17, -.03]*	.00
Pride *	7	.63	.20 (.33)	1.78 (.25)	1.73 (.27)	1.81 (.23)	[-.13, -.02]*	.04	1.73 (.27)	1.83 (.20)	[-.15, -.05]*	.03

Note. The MEQ was scored on a 3-point scale (0 = never, 1= sometimes, 2 = often). Total N = 377 (n = 127 for < 4 years; n = 250 for ≥ 4 years; n = 208 for Boys; n = 169 for Girls). Ω = McDonald's omega. IIC = inter-item correlation. CI = confidence interval. d = Cohen's d. *p < .05. Age category, and gender comparisons showed that for both groups differences were found for the Guilt and Pride scales

Concurrent Validity

As shown in Table 7, shame was positively associated with externalizing and internalizing behaviours. Guilt was negatively associated with externalizing behaviours and positively associated with social competence. Pride was positively associated with social competence. No other significant correlations were observed.

Table 7 Correlations of MEQ scales with indices for internalizing and externalizing problems, and with social competence (corrected for age).

	Internalizing Behaviors	Externalizing Behaviors	Social Competence
MEQ-Shame	.249***	.299***	-.070
MEQ-Guilt	-.034	-.304***	.388***
MEQ-Pride	.082	.030	.200***

Note. N = 205. * $p < .05$; ** $p < .01$.; *** $p < .006$ (after Bonferroni correction)

DISCUSSION

The outcomes of this study suggest that the three moral emotions, that is, guilt, shame, and pride, can be identified separately in early childhood through the MEQ. The originally proposed 25-item model was not confirmed. However, after extracting eight items due to theoretical–statistical reasons (e.g., low factor loadings; high loading on the non-intended factor; theoretical appropriateness of the item; overlap with other 17-item model based on the hypothesized three-factor structure, with a satisfactory goodness of fit). Although eight items were deleted, the final 17-item model still represents the intended constructs, considering that besides the statistical results, the appropriateness of each item in its intended scale was considered in each step. This resulted in the deletion of items from each scale that referred to more general behaviours, and therefore lacked an action tendency related to its intended construct (e.g., in shame—"My child is afraid of making mistakes," "My child gets upset when he/she has done something wrong"). Furthermore, only items that clearly reflected the action tendencies of its intended scale were kept. For example, in our questionnaire, shame was operationalized as the tendency to show submissive behaviour or to withdraw or escape from a situation. Therefore,

looking at the remaining four items from the final model, we see that they reflect these action tendencies (e.g., “My child hides when he/she has done something wrong,” “My child quickly walks away when he/she has done something he/she is not allowed to do”).

Measurement invariance analysis across gender showed that the factor loading of one item from pride differed across gender. Furthermore, the intercepts of three items (one item from guilt and two items from pride) were variant across gender. While previous studies have shown that female participants tend to report significantly more action tendencies of shame, guilt, and pride than male participants (Beißert & Hasselhorn, 2016; Else-quest et al., 2012; Etxebarria et al., 2019; Kushnir et al., 2016), our results seem to further show that the action tendencies of pride could be different in girls and boys. As for measurement invariance across age groups (< 4 or $\geqslant 4$ years), the analysis showed that all the items have similar meanings for caregivers. Yet, intercept invariance across age groups was only achieved after releasing the equality constraints on five items (one item from guilt, two items from shame, and two items from pride). This indicates that the younger group in this study was at the early stages of developing moral emotions, and therefore was expected to show less action tendencies related to shame, guilt, and pride, compared to the older age group. Although only partial invariance was achieved, the proportion of invariant items on each factor was above the required level (i.e., $\geqslant 50\%$). Therefore, the constructs can be considered as equally calibrated across groups, and group means could be compared (Steenkamp & Baumgartner, 1998; Vandenberg & Lance, 2000). Although acceptable, all three scales showed low internal consistencies. However, the concurrent validity of these three scales was further confirmed by the relationships of the three moral emotions with externalizing behaviours, internalizing behaviours, and social competence. These correlations conformed exactly with our hypotheses, and were in line with the literature on this topic (Ferguson et al., 1999; Hooge et al., 2011; Kluwin et al., 2002; Mascolo & Fischer, 1995; Roos et al., 2014; Stuewig et al., 2010; Tangney et al., 1996; Thomaes et al., 2011).

As mentioned earlier, previous studies focusing on young children have not yet distinguished between the three moral emotions included in our newly developed questionnaire. Not only did this study show that shame, guilt, and pride can be distinctly observed in preschool children; it also showed that these emotions turned out to have distinct relationships with other domains of social–emotional functioning.

First, relations found in our results confirm previous studies that characterize guilt as an adaptive emotion (Baumeister et al., 1994; Broekhof et al., 2018; Estrada-Hollenbeck & Heatherton, 1995; Frick & Morris, 2004; Kochanska & Aksan, 2006). Parents reported that children who expressed more guilt behaviours after a transgression showed fewer externalizing behaviours (e.g., aggression or rule-breaking) and higher levels of social competence. These findings confirm outcomes from previous studies that were focused on older children and adolescents (Baumeister et al., 1994; Broekhof et al., 2018; Estrada-Hollenbeck & Heatherton, 1995; Frick & Morris, 2004; Kochanska & Aksan, 2006).

Second, we found that pride, much like guilt, also serves an adaptive purpose. In line with other studies (Hooge et al., 2011; Kluwin et al., 2002; Mascolo & Fischer, 1995), our results showed that pride was related to better social competence. This suggests that pride allows children to feel confident enough to interact with peers, and that showing others that you are a valuable asset to the group indeed helps you to be evaluated positively by others.

Third, shame seems to serve a different function, in line with previous studies, our study portrays shame as a maladaptive emotion; higher levels of shame behaviours were related to more internalizing and externalizing behaviours (Tangney et al., 1992; Thomaes et al., 2011). The social context and content of transgressions in this study may help explain these outcomes, for example, the shame items in the questionnaire all involved wrongdoing, for example, breaking something or disobeying a rule. In those cases, children were commonly expected to make eye contact and admit their transgression, thus showing their guilt. Avoidant behaviours were usually perceived as trying to avoid the blame or punishment (Barrett et al., 1993; Estrada-Hollenbeck & Heatherton, 1995; Stuewig et al., 2010), which might explain the maladaptive function of shame behaviours in those contexts. Yet an unwanted identity (a core feature of shame) does not necessarily involve harm or wrongdoing, as formulated in the items in the questionnaire. Instead, shame can also arise from walking around with a bad haircut or accidentally tripping over a carpet, or other clumsy behaviours. These shame-only occasions with no guilt involved, where no explicit harm was done to another, were not included in this questionnaire. However, including such items could provide a more

adaptive function of shame. This other context for shame might be a valuable addition in future studies.

This study did have some limitations that need to be highlighted. First, parents were our only informants in regard to their children's manifestations of morally guided behaviour and psychosocial functioning. Second, future studies should compare these parent reports with reports from other informants (e.g., preschool teachers) and field observations, to further confirm the validity of the MEQ. Third, cross-cultural studies with the MEQ could be informative, because the literature on these emotions often discusses the different functions of moral emotions in Western, individualistic-oriented cultures versus Eastern, collectivistic-oriented cultures (Bedford & Hwang, 2003; Cole et al., 2006; Fung, 1999; Midlarsky et al., 2006; Yoshioka & Choi, 2005). For individuals from Eastern cultures, the collective harmony (group) is more important than individual independence. In these societies, failing to achieve the group demands causes the individual to feel as a failure. This sense of failure is extended to their families, which even puts a higher pressure on the individual to behave well within the norms and values of that group (Bedford & Hwang, 2003). Shame, in collectivistic-oriented cultures, seems to have a self-regulative function, preventing individuals from acting against social norms (Bedford & Hwang, 2003; Cole et al., 2006; Fung, 1999; Midlarsky et al., 2006; Yoshioka & Choi, 2005). Guilt, seems to have the same functions cross-culturally (Bedford & Hwang, 2003; Merolla et al., 2013). As for pride, previous studies have shown that in collectivistic cultures it is emphasized that a person should feel pride in situations that positively contribute to others (e.g., helping someone else; Stipek, 1998; Stipek et al., 1989). Also, it is reported that Eastern individuals do not emphasize the value of self (Heine et al., 1999), and therefore individual pride, is less prominent and even discouraged in these societies. Therefore, cross-cultural studies with the MEQ are needed as the results obtained may only hold true in Western populations. Fourth, the cross-sectional nature of this study prevents us from drawing conclusions about the directionality of the relationships we found between the three moral emotions and externalizing behaviours, internalizing behaviours, and social competence. We assume that it is the anticipation of the moral emotions that has an effect on the way children behave toward others, and not the other way around. Yet, this must be confirmed in longitudinal studies. Fifth, future longitudinal studies should endeavor to identify which factors underlie the development of moral emotions. Insight into which factors support

the development of moral emotions will improve our understanding of how to develop effective preventive interventions to stimulate the development of these crucial emotions. Sixth, future studies should also look into the relation between the MEQ scales and observational data, to further contribute for its validity. Finally, for this study, the participants were evaluated in a single time point. Future studies should assess test re-test reliability, not only to improve internal validity, but also to understand the stability of this measure over time.

In sum, the MEQ appears to be a promising and reliable instrument for evaluating the extent to which young children experience and display distinct moral emotions, through the parents' perspective. The MEQ does offer some important advantages: first, the MEQ is an easy-to-administer instrument. It is far less time consuming and more cost-effective than observational methods. Second, it provides an ecologically valid way to assess moral emotions in early childhood, as parents are able to report on their children's moral behaviour over time and across situations. Furthermore, the MEQ gives us the opportunity to examine new research questions, including those that concern early impairments in moral development and their underlying causes, or how moral development further affects other social–emotional functioning domains. Answers to these questions could help professionals understand the basis and consequences of possible impairments in moral development, and create strategies that promote children's moral, emotional, and social development.

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Chapter 8

Associations of shame and guilt with externalising behaviour in deaf and hearing children

Rieffe, C., Da Silva, B.M.S., Frijns, J.H.M., Sousa, H., Monteiro, L., Veiga, G. [Submitted]. Associations of shame and guilt with externalising behaviour in deaf and hearing Children.

ABSTRACT

Moral emotions evolve during the first years of life, making children aware and abiding to societal rules. Recent studies showed that guilt and shame impact social relationships differently. Guilt, aimed at avoiding harming others, associates with fewer externalising problems and (proactive) aggression. Shame, aimed at self-improvement, associates with more externalising problems and (reactive) aggression. Since these emotions rely heavily on input from the social environment and social learning, this might be more difficult for children who often face (invisible) barriers to access their social surroundings, e.g., children who are Deaf or Hard-of-Hearing (DHH). We aimed to study the relationships between moral emotions, externalizing behaviours and aggression (reactive and proactive) in DHH and hearing children. We expected shame to be positively associated with externalising problems and reactive aggression, and guilt to be negatively associated with externalizing problems and proactive aggression, in both groups. Our study included 42 DHH children and 199 hearing children (mean age 5 years, 6 months; range 37-107 months; recruited between 2017-2022). Their caregivers filled out questionnaires regarding their moral emotions, and 3 indices for externalizing behaviours (externalsing problems, reactive/proactive aggression). No differences appeared between DHH and hearing children. Outcomes for the total sample showed negative associations for guilt with all indices for externalising behaviours. Shame was positively associated with reactive aggression only. The different function of shame and guilt was similar for DHH and hearing children. Early and bilateral hearing aids might have supported DHH children better access to social participation.

INTRODUCTION

Whereas basic emotions (e.g. anger or fear) are thought to be innate or at least present in the earliest stage of life, moral emotions like guilt and shame come later in development, as they are linked to what a given society or social group maintains as morally "right or wrong" behaviour. These kinds of moral emotions are important as they demarcate boundaries within interpersonal relationships. For example, guilt prohibits aggression towards ingroup members; whereas shame contributes to respect social hierarchy (Dempsey, 2017; Tangney et al., 2007). Moral emotions thus guide behaviours based on a social compass, which children need to develop through social learning.

To develop this social compass, knowledge about unwritten, often implicit social rules is required. This kind of knowledge is acquired through social learning which can be more challenging for children who may experience difficulties accessing their social environment, as is the case for Deaf and Hard-of-Hearing (DHH) children. Even with well-fitted hearing devices, conventional hearing aids as well as cochlear implants, these techniques have their limitations. To date, these aids still make it difficult to filter different simultaneous sounds. For example, a DHH child at a playground or busy classroom will have difficulties hearing a targeted person whilst ignoring or dampening other sounds, as most hearing children can automatically. To date, studies that examined shame and guilt in DHH and hearing participants focused on children and/or adolescents, and consistently showed lower levels of both guilt and shame compared to hearing peers (Broekhof et al., 2018, 2020, 2021; Ketelaar et al., 2015), emphasizing the important role of children's access to their social environment and subsequent social learning in the development of moral emotions. Yet how these moral emotions affect interpersonal relationships seems to be different for guilt and shame.

GUILT, RESTORING THE HARM

Feelings of guilt arise when harm is done to another person, and one feels responsible for this (Tracy & Robins, 2004). Guilt evokes the urge (i.e. action tendency) to restore, to make up, which can take the form of an apology, or actual reparations (Frijda, 1986; Tangney et al., 2007). Guilt is thus focused on the other person(s), or on the relationship with that person, and efforts are made to safeguard that relationship

and/or the well-being of the harmed person (Dempsey, 2017; Tracy & Robins, 2004). In support of these theoretical assumptions, empirical studies showed how higher levels of guilt are related to more empathy, and prosocial behaviours, yet less delinquency and proactive aggression, i.e., instrumental aggression to obtain certain goals (Barón et al., 2018; Broekhof et al., 2018, 2020, 2021; Novin & Rieffe, 2015).Some of these studies also showed these associations over time, thus confirming the causal role that guilt plays in preventing aggression. Note that this pattern is found in both hearing and DHH adolescents (Broekhof et al., 2021).

SHAME, BECOMING A BETTER PERSON

Shame is supposed to evoke the urge to become a better person, whilst emphasizing and respecting social status (Nichols, 2015). This "better person" wants to live up to the ideal of a good citizen, showing respect towards their peers, parents, and teachers, thus doing what is morally right within their social ranking. Shame arises when a child transgresses or fails to meet the ruling social or moral standards and others have witnessed, or worse, have (publicly) named this transgression (Izard, 1977). Failures thus may result in feeling devalued, and being socially ostracized (Frijda, 1993; Nichols, 2015). Literature shows that feelings of shame are commonly related to low self-esteem and poor mental health in older children and adolescents (Tangney et al., 2007). Importantly, feeling ashamed implies that the focus is inward and negative about oneself. The shameful child will try to hide, disappear, or try to ignore, or dismiss what happened. Yet, this negative feeling about oneself, especially when exposed publicly, can easily turn into anger or aggression towards the person who "exposed" the shamed person, or it can result in reactive aggression in general (Tangney et al., 2007) . Previous studies confirmed that more shame was related to more externalising problems in preschool children (da Silva et al., 2022; Li et al., 2023); more anti-social behaviours in school children (Barón et al., 2018), and more reactive aggression in DHH and hearing adolescents (i.e. aggression in response to a perceived threat or provocation) (Broekhof et al., 2021).

PRESENT STUDY

Moral emotions like shame and guilt are important milestones in early development, as children need to learn societal norms and adapt their behaviours accordingly. However, whereas the positive impact of guilt is well-documented, shame

seems to be more harmful rather than strengthening social relationships or one's position in the social (peer) group. Although studies among preschool children indeed confirmed these relationships for the moral emotions of shame and guilt with externalising problems (Li et al., 2023), this has not yet been studied in the context of peer-related aggression. Yet, studies that involved older age groups confirmed the different relationship of reactive/proactive aggression with shame and guilt in DHH and hearing adolescents (Broekhof et al., 2021).

The first aim of this study was to examine differences in levels of moral emotions (shame and guilt), externalising problems, and peer-related aggression (proactive and reactive aggression) between DHH and hearing preschool children. Based on previous studies, we expected lower levels of moral emotions, but higher levels of externalising problems and aggression in the DHH group compared to their hearing peers (Broekhof et al., 2021; Ketelaar et al., 2015).

The second aim of this study was to examine the extent to which moral emotions are related to externalising problems and both forms of aggression in the two groups. Based on previous studies, we expected that shame would be positively associated with externalising problems and reactive aggression, while guilt was expected to show a negative association with externalizing problems and proactive aggression (Li et al., 2023). We expected these associations to be similar in DHH and hearing children (Broekhof et al., 2021).

METHODS

Design

A cross-sectional study design was employed in the current study, with the data collection being conducted between 2017 and 2022.

Participants and Procedure

A total of 42 DHH (Mage = 65.21 months, SD = 17.08 months; 62% boys) and 199 hearing (Mage = 66.87 months, SD = 14.74 months; 51% boys) children participated (Table 1). DHH children were recruited through doctors from two hospitals in Lisbon. To prevent any bias in the selection of participants for the clinical group, all caregivers of eligible children were informed about the purpose of the study and asked for participation.

Caregivers who agreed were asked to fill out questionnaires and indicate the (pre)school that their DHH child attended. These schools were contacted, and to prevent any bias in the selection of children for the control group, caregivers of all children in classes with the DHH children were also asked to participate. Approval for this study was obtained from Leiden University Ethical Committee, the Portuguese Committee of Data Protection and the Portuguese Directorate of Education. This study is part of a larger study on social and emotional functioning in DHH and hearing preschool children.

Table 1. Demographic characteristics of participants

	Total study population		DHH study population		
	TH	DHH	Bilateral CI	Bilateral HA	Bimodal (CI&HA)
No. of children	199	42	22	15	5
Age					
Mean – in months (SD)	66.87 (14.74)	65.21 (17.08)	70.47 (19.40)	60 (12.02)	65.40 (22.31)
Range – in months (SD)	37 – 107	37 - 107	37 - 92	41 - 107	40 – 98
Gender					
Male (%)	102 (51.3%)	26 (61.9%)	13 (59.1%)	10 (66.7%)	3 (60%)
Language Indices					
Emotion Vocabulary***	.70 (.17)	.57 (.24)	.57 (.25)	.55 (.24)	.60 (.20)
Preschoolers - n	35	30	17	9	4
Comprehension***	.96 (.07)	.88 (.11)	.88 (.12)	.89 (.07)	.88 (.18)
Production***	.98 (.07)	.73 (.32)	.73 (.36)	.71 (.31)	.79 (.23)
Pragmatics***	.56 (.31)	.17 (.29)	.21 (.32)	.09 (.17)	.21 (.42)
Elementary - n	31	11	4	6	1
Total***	1.65 (.21)	1.13 (.61)	.87 (.61)	1.19 (.62)	1.76
Degree of hearing loss					
Moderate – 40 – 60 dB (%)		6 (14.3%)		6 (40%)	
Severe – 61 – 90 dB (%)		9 (21.4%)		9 (60%	
Profound - > 90 dB (%)		24 (57.1%)	22 (100%)		2 (40%)
Severe & Profound (%)		3 (7.1%)			3 (60%)
*Hearing age****	66.87 (14.74)	43.48 (17.25)	43.46 (10.10)	42.13 (22.85)	47.60 (25.64)

* p < .05 ; ** p<.01; *** p < .001 (after Bonferroni correction)

Measures

The Moral Emotions Questionnaire (MEQ; da Silva et al., 2022)) asks caregivers to report on their child's behavioural responses associated with shame (4 items; e.g., "My child hides when s/he has done something wrong") and guilt (6 items; e.g., "My child shows that s/he regrets something"). Items were rated on a 3-point scale (0 = never, 1 = sometimes, and 2 = often). Higher mean scores indicate higher levels of shame and guilt.

The Portuguese Strength and Difficulties Questionnaire (SDQ: Fleitlich et al., 2005; Goodman, 1997)) was filled out by caregivers. For the purpose of this study, the Behavioural Problems and Hyperactivity scales were combined to provide an Externalising Problems scale (SDQ; Goodman et al., 2010; Goodman, 1997)). Caregivers rated their child's behaviours (10 items; e.g., "Restless, overactive, cannot stay still for long") on a 3-point scale. (0 = not true, 1 = somewhat true, 2 = certainly true). Items' scores are averaged and a higher mean score indicates more externalising problems. The internal consistency was good (table 2; ω=.73).

Reactive and proactive peer aggression were obtained using the Aggressive Behaviour Rating (da Silva et al., 2023; Dodge & Coie, 1987). Caregivers rated 6 items regarding reactive aggressive behaviours (e.g., "When teased, strikes back", 3 items), and proactive aggressive behaviours (e.g., "Threatens or hits other children", 3 items), on a 5-point scale (0 = (almost) never to 4 = (almost) always). Mean scores were computed per scale. Higher mean scores indicate higher levels of aggression. For both scales, the internal consistency was good (table 2; ω=.73, ω=.73).

Descriptives and internal consistencies per scale are presented in Table 2.

Table 2 Psychometric properties for Shame, Guilt, Externalising Problems and Peer Aggression

	No. items	Range	McDonald's Omega	Cronbach's Alpha	Mean inter-item correlation	Mean (SD)			
						Hearing (n = 199)	DHH (n = 42)	HA (n = 15)	CI (n = 22)
Shame	4	0 – 2	.66	.66	.33	.64 (.41)	.72 (.44)	.83 (.36)	.69 (.48)
Guilt	5	0 – 2	.60	.61	.28	1.36 (.35)	1.36 (.41)	1.40 (.45)	1.35 (.43)
Externalising Problems	10	0 -2	.73	.71	.20	.66 (.32)*	.77 (.35)*	.81 (.36)	.72 (.39)
Reactive Aggression	3	0 – 4	.73	.70	.44	1.39 (.75)	1.37 (.86)	1.49 (.91)	1.36 (.84)
Proactive Aggression	3	0 - 4	.73	.67	.40	.38 (.53)	.36 (.42)	.53 (.51)	.29 (.35)

* $p < .05$; ** $p < .01$.(after Bonferroni correction

STATISTICAL ANALYSES

The current study was registered prior to data analyses. This registration can be assessed through OSF. For the translation of the MEQ into Portuguese, we followed the procedure introduced by Brislin (1986). To assess construct validity of the Portuguese shame and guilt scales, we performed a CFA where the originally proposed model (da Silva et al., 2022) was tested. Since the data was not normally distributed and was categorical in nature, we used the weighted least-squares means and variance adjusted (WLSMV) estimation (Brown, 2006). Items were considered appropriate within their designated scale if their factor loading was higher than .300. The model was considered as appropriate if the $\chi 2/df$ was lower than 3 (Bollen, 1989); the root mean square error of approximation (RMSEA) was equal or lower than .060(Hu & Bentler, 1999); the comparative fit index (CFI) was higher than .900 (Bollen, 1989); and the standardised root mean square residual (SRMR) was lower than .080 (Little, 2013).The CFA was conducted using R's (version 4.4.1) Lavaan package (version 0.6-18; Rosseel, 2012)).

The CFA with the originally proposed items for the Moral Emotions Questionnaire Indicated a poor fit ($\chi 2/df = 2.183$; RMSEA = .072; CFI = .687; SRMR = .100). To improve the model we sequentially deleted items with a factor loading that did not exceed .300. Following this step-wise method, items 16, 23, 20, 18, 12, 10 were deleted in this specific order, resulting in Model 2 (table 3). Model 2, showed a robust goodness of fit, since all the fit indices reached their desired cut-off values ($\chi 2/df = 1.838$; RMSEA = .063; CFI = .903; SRMR = .076). Shame and guilt scales showed acceptable internal consistencies after item deletion (table 2; ω=.66, ω=.62).

Table 3 Shame and Guilt items and CFA factor loadings

	Shame	Guilt
1 – My child hides when they have done something wrong	.79	
4 – My child does not look at me when they have done something wrong	.41	
9 – My child quickly walks away when they have done something that is not allowed	.52	
17 – When my child has broken something, they try to hide it from me	.55	
3 – When my child does something that is not allowed, they to make up for it (e.g., saying sorry)		.30
6 – My child shows when they regret something		.40
13 – When my child breaks something of someone else, they try to repair it		.65
21 – When my child does something wrong (e.g., spill something), they try to fix it (e.g., fetches a cloth)		.46
24 – When my child breaks something of someone else, they want to make up for it		.64

McDonald's omega and inter-item correlations were used to assess internal consistencies. Few missing values occurred. Little's MCAR test showed missing values (<2.2%; 13 participants) were missing at random ($p > .05$). Listwise deletion was used for the cases with missing values.

T-tests were conducted to test for group differences between DHH and hearing; and within the DHH group (bilateral CI versus bilateral HA). Significant correlations were found for age x guilt ($r = .232$; $p < .001$), thus age was controlled for in all correlations. Fisher r-to-Z transformations were used to examine the strength of the correlations per group. To correct for multiple testing, the Bonferroni procedure was applied, and the significance level of the main analyses was adjusted.

RESULTS

Independent sample t-tests (Table 2) showed no differences between hearing and DHH children. Also, exploratory analysis within the DHH group revealed no differences

between the bilateral CI and bilateral HA users (Table 2). Correlations analyses, controlled for age, showed positive associations for shame with externalising problems ($r = .138$, $p = .033$) and both types of aggression (proactive: $r = .152$, $p = .018$; reactive: $r = .260$, $p < .001$). However, after Bonferroni correction (.008) shame was only associated with reactive aggression. Regarding guilt, negative associations were found for externalising problems ($r = -.348$, $p < .001$) and both types of aggression (proactive: $r = -.225$, $p < .001$; reactive: $r = -.223$, $p < .001$). After Fisher r-to-Z transformations were applied, no group differences between the strengths of the correlations appeared.

DISCUSSION

Moral emotions guide interpersonal human actions towards socially acceptable or "correct" behaviours, respecting societal rules and hierarchies. This study confirmed that young children already have some understanding of these often implicit societal rules, as even at this young age, their caregivers are able to distinguish between their shame and guilt behaviours in their children. The outcomes of this study further confirmed the positive function of guilt on social relationships with both adults (fewer externalising problems) and peers (lower levels of peer related aggression, both reactive and proactive), although we had expected proactive aggression to uniquely relate to guilt (Broekhof et al., 2021). Shame, however, seemed uniquely related to more reactive aggression (after we corrected for multiple testing), which further confirms the assumed underlying anger as a reaction to being exposed and publicly devaluated (Broekhof et al., 2021).

Importantly, this study showed no differences between the two groups (DHH and hearing), contradicting previous studies that showed lower levels of moral emotions in DHH children (Broekhof et al., 2021). Note that most children in our study had an earlier age of implantation, and bilateral hearing devices, whereas previous studies involved at least 50% unilateral hearing aids. For obvious reasons, bilateral hearing aids give children an advantage over children with unilateral aids, as sound can be detected now from more angles, but also the direction of the sound can be located. This makes it easier to locate the speaker, and will give better opportunities to react, and thus effectively participate in the peer group. In sum these outcomes emphasise the importance of auditory access for

informal learning situations, as children can thus better benefit from social learning within the peer group like their hearing peers.

LIMITATIONS AND FUTURE DIRECTIONS

The current study contained certain limitations which may give directions to future studies. First, the design of this study was cross-sectional, which prohibits drawing conclusions regarding causality. Longitudinal studies could further explore the differential functions of shame and guilt, and their subsequent contribution to the development of different forms of aggression and/or behavioural problems, such as oppositional behaviours or conduct problems. Second, children's emotional functioning in this study was assessed through parent reports, possibly causing single-informant bias. Therefore, future studies may use a multi-method and multi-informant design to have a broader view on childrens' development. Including teachers' and peers' reports, and playground observations may provide valuable insights into the specific contexts in which peer aggression occurs. Third, the current study did not fully examine individual differences within the clinical population, e.g. the age of detection. The outcomes may thus not accurately reflect the heterogeneity of the DHH population, which is important in future studies to provide more exact information on how hearing related factors exactly contribute to morality.

CONCLUSION AND CLINICAL IMPLICATIONS

Besides the importance of improved care for DHH children so that they can better access their social world, another main finding in this study is the differential function of shame and guilt, already observed now in young children. Whereas shame is supposed to make "a better person", respecting social ranking, it seems that levels can easily go up to an extent that the shamed person feels possibly humiliated and wants to strike back or act out. Guilt, on the other hand, is not self-focused like shame, but other-focused instead, which seems to improve relationships rather than harming them. Yet, also too much guilt may become dysfunctional, as this can relate to internalising symptoms, like depression (Ghatavi et. al., 2012). Nevertheless, also for shame, although harmful in the moment and shortly thereafter (Broekhof et. al., 2020), in the long term both emotions are expected to increase awareness regarding social rules and ranking, enhancing a society that can

function without physical force (Frijda, 1993; Nichols, 2015). It thus seems clinically relevant to better understand when certain levels, or perhaps different modes of communication, become dysfunctional instead to the individual. For example, the (public) exposure of shameful behaviour might be damaging, evoking aggression, whilst a more subtle, implicit form of communication might still denote the mishap, but be less harsh on the person's feelings of self-worth.

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Chapter 9

General Discussion

The aim of the current thesis was to understand the social functioning of Portuguese DHH preschool children in the context of their peer group. More specifically, we aimed to understand differences and similarities in the social behaviours of DHH and hearing preschoolers in the playground setting, and how these behaviours relate to children's intrinsic factors (i.e., socioemotional and language skills) and extrinsic factors (i.e., physical and social environment). Understanding the factors that contribute to DHH children's social functioning can better guide us towards creating a more equitable environment that allows these children to feel welcomed, safe, and happy within their peer group.

A common image that arises with the word 'playground' is that of children exploring, observing others, running around while chasing one another, play-fighting while pretending to be super-heroes, discussing things that they like with their peer group, laughing together, and sometimes arguing with each other, yet becoming friends again. Thus, intuitively we understand that playgrounds are important for children's development by providing them with opportunities to explore their interests, spontaneously interact with their peers, and make friends that may last into adulthood. Although playgrounds function as a social arena through the different stages of childhood, they are especially important during the preschool years, when children start to gain more interest in their peers (Sullivan, 1953). While for infants most of their development relies on their daily interactions with their caregivers, for preschoolers a large part of their development is shaped by daily social interactions within the peer group – which mostly occur at the playground and other similar informal settings where children can play and interact freely (Bedell & Dumas, 2004; Law, 2002; Saarni, 1999). These interactions – positive or negative – are so important for children's development that research has consistently shown that they are crucial predictors of their overall development and mental health (Ladd, 1999; Malecki & Elliot, 2002).

Although the common positive image of children playing and laughing together at the playground is true for many children, there are children who experience other kinds of social involvement in these settings. In this complex context, some children opt to spend some time solitarily. In line with previous studies (e.g., Antia et al., 1998; Brown et al., 2008; Deluzio & Girolametto, 2011), DHH preschoolers in our research spent more time in solitary behaviours during outdoor time at their preschool playgrounds compared

to their peers, mostly in onlooking behaviours. Importantly, they spent less time in social interaction during their recess time compared to their hearing peers (**chapter 3**). Yet, despite spending more time alone, DHH children also found opportunities for engaging in play — mostly exercise play — to the same extent as their hearing peers (**chapter 3**). This seems to suggest that DHH children join the peer group in ways or at moments when explicit verbal social contact is less important.

Thus, inspired by the social-ecological model by Bronfenbrenner (1979), we discuss the interplay between the characteristics of DHH children and their microsystem. Bronfenbrenner's social-ecological model (1979) describes human development as the interaction of multiple systems surrounding the child, who is at the centre (Figure 1). This innermost circle includes the child's own characteristics, while the microsystem comprises the intervenients of their daily social interactions like family, peers, and school. We will discuss how DHH children's interpersonal characteristics (intrinsic factors) and characteristics of their microsystem (extrinsic factors) relate to their playground behaviours. Understanding the interaction of these different factors may reveal the various layers influencing children's activities on the playground and highlight necessary changes to promote DHH children's participation in peer groups.

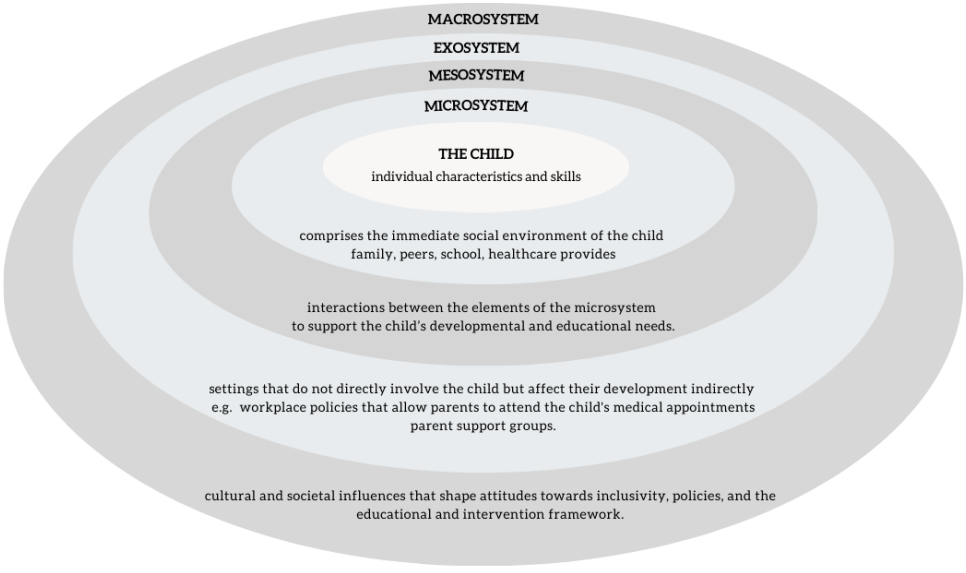

Figure 1. Bronfenbrenner social-ecological model in DHH children

THE INNER CIRCLE - THE DHH CHILD

Social skills

Contrary to what has been shown in previous studies comparing DHH and hearing children or adolescents (Antia et al., 1998; Bat-Chava et al., 2005; Kouwenberg, 2013; Theunissen et al., 2015; Wiefferink et al., 2012), the DHH preschoolers in our studies did not show lower levels of social skills. More specifically, outcomes on measures for externalising problems, aggression and prosocial actions revealed no differences between DHH preschoolers and their hearing peers of the same age **(chapter 5 and 8)**. The prevalence of externalizing problems provides insight into children's abilities to interact appropriately with their social environment (Berdan et al., 2008; Olson & Brodfeld, 1991; Witvliet et al., 2009). Externalizing problems can distinctively include actions like reactive aggression, characterized by impulsive responses to perceived threats, and proactive aggression, which involve intentional actions aimed to achieve a goal (Dodge & Coie, 1987; Marcus & Kramer, 2001; Poulin & Boivin, 2000; Skripkauskaite et al., 2015). Prosocial actions, on the other hand, involve behaviours such as sharing, helping, and cooperating, which are aimed towards others and are essential for building positive peer interactions in preschoolers (Eisenberg et al., 2006, 2015; Hoffman, 2001). In our sample, both groups, DHH and hearing, exhibited similar levels of externalizing problems, both types of aggression, and prosocial actions (**chapters 5 and 8)**. Therefore, it seems plausible to assume that differences in playground behaviours were unrelated to a different level of DHH children's social skills compared to their hearing peers.

Social emotions

Contrary to what was found in previous studies (Ketelaar et al., 2013, 2015; Kouwenberg, 2013; Wiefferink et al., 2012), our DHH preschoolers did not differ from their hearing peers regarding social emotions, which were addressed by examining empathy and moral emotions **(chapters 5 and 8).** Empathy allows children to share the feelings of others, pay attention to them, and prompt them to be engaged in prosocial actions such as sharing, comforting, and cooperating, which are essential for positive interactions and emotional bonds to occur within the peer group (Decety & Jackson, 2004; Findlay et al., 2006; Hoffman, 2001; Qiu et al., 2024). Shame and guilt, on the other hand, are part of moral development, and foster positive social participation by guiding preschoolers to recognize and correct their mistakes (Orth et al., 2010; Pivetti et al., 2016;

Price et al., 1996; Tangney, 1998). More specifically, when a preschooler feels shame, it often leads to a negative self-evaluation about oneself, while guilt prompts them to make amends (Dempsey, 2017; Menesini & Camodeca, 2008). Although in different ways, both of these emotions serve as behaviour regulation mechanisms, as the negative experience of shame and guilt discourages children from repeating the same actions (Dempsey, 2017; Menesini & Camodeca, 2008). In our sample both groups exhibited similar levels of empathy (**chapter 5)**, shame and guilt (**chapter 8)**, and we may infer from these outcomes that differences in playground behaviours were unrelated to social emotions.

Emotional competence

Contrary to previous reports (Akkaya & Doğan, 2023, Calderon & Greenberg, 2012; Sidera et al., 2017; Wang et al., 2019; Wiefferink et al., 2012, Ziv et al., 2013), our DHH preschoolers also did not show lower levels of emotional competence, which were addressed by focusing on emotion recognition and emotion regulation (**chapter 5**). The ability to recognize others' emotions is considered as an important aspect for peer interactions (Lyusin & Ovsyannikova, 2016; Song, 2021). Emotions inherently serve children's communicative purposes, enabling people to show others what they like and dislike, when they need comfort or want to be alone, and their enjoyment or desire to stop a certain behaviour (Frijda, 1986). Therefore, being skilful in emotion recognition facilitates peers' interactions by allowing children to better comprehend other's needs in given situations. While recognizing others' emotions acts as a protective factor for successful peer interactions, the inability to regulate the emotional demands that arise during these interactions is known to be a risk factor (Gross & Thompson, 2007; Harrington et al., 2020). When children struggle to manage their emotions, this directly impacts their social interactions as they tend to show more negative behaviours towards their peers, engaging in more conflicts, and exhibiting less prosocial behaviours (Blair et al., 2015; Harrington et al., 2020; Supplee et al., 2009). In our sample both groups were equally capable of decoding others' emotions and regulating their own **(chapter 5)**, which suggests that differences in playground behaviours were unrelated to emotional competence.

Language skills

DHH and hearing preschoolers differed in their language skills. DHH children, exhibited lower general language skills (i.e., comprehension, production and pragmatics), and lower emotional language skills, compared to their hearing peers **(chapters 5 and 8)**. Each of these language skills plays a distinct - but important - role in preschoolers' daily interactions. Language comprehension allows preschoolers to understand and interpret the words; production empowers preschoolers to communicate their thoughts, emotions, and needs effectively; and pragmatics imply the understanding and use of social rules in communication, e.g., how to appropriately initiate conversations and take turns during conversations (Bohn et al., 2023; Clifton et al., 2012; von Grünigen et al., 2012). Additionally, emotional language skills allow preschoolers to understand and use emotion and mental state language in their daily social interactions (Ketelaar et al., 2015; Veiga et al., 2023). Although many studies have found that language plays a pivotal role in children's interactions (Barker et al., 2009; Brown & Watson, 2017; Macaulay & Ford, 2006), our findings were aligned with a study conducted by Ketelaar and colleagues (2015), suggesting that language skills do not play a major role in DHH children's social functioning **(chapters 5 and 8).** It seems that although DHH children tend to have more difficulties in their oral communication, this does - fortunately – not hinder them from engaging in conversations with their peers, which was one of their preferred activities in the playground setting **(chapter 3).** Note also that general language skills were unrelated to their socioemotional skills, suggesting that DHH children are also able to overcome those difficulties and match their peers when it comes to their socioemotional development **(chapters 5 and 8).** Thus, although DHH preschoolers in our sample exhibited more difficulties in their language skills compared to their hearing peers, this aspect was still unrelated to the differences found in their playground behaviours.

Therefore, going back to the first aim of the current thesis, we do see that DHH preschoolers tend to be more solitary at the playground setting than their hearing peers. However – and contrary to our initial assumptions regarding the second aim – these non-social behaviours were unrelated to their overall competencies, as these were comparable to their hearing peers. Thus, in light of the social-ecological model, this suggests that the difference between DHH and hearing children's movements in the playground arises

from the influence that characteristics of their microsystem (extrinsic factors) impose on these children, rather than intrinsic factors.

BOX 2. Assessing preschoolers' social functioning

Methodologically, assessing social and emotional functioning in preschoolers can be challenging considering the lack of validated instruments that are reliable and appropriate for this developmental stage. Aiming to provide a comprehensive outlook on preschoolers social and emotional functioning, this thesis employed a combination of technology with traditional methods, and validated two caregiver reports specifically tailored for this age group.

Traditional methods combined with technology

In **chapter 3 and 6**, traditional methods were combined with technology to improve data collection. More specifically, in **chapter 3** naturalistic playground observations used to assess preschoolers playground behaviours were supported by a newly developed software specifically designed for these types of studies, which facilitated the coding and data transcription process (Observideo). Furthermore, in **chapter 6** peer preference data also comprised the use of a newly validated measure for preschoolers, the computerized sociometric assessment (Endedijk & Cillessen, 2015). This method has shown equal reliability as traditional techniques, while offering a more time-efficient, cost-effective, and minimal distraction of young children (Endedijk & Cillessen, 2015).

Validation studies

Whether designing new questionnaires, or adapting pre-existing ones, validation studies focused on instruments for preschoolers contribute to research by providing instruments that capture intended constructs and produce reliable results that are age and culturally appropriate. The process of developing a questionnaire consists of many steps, starting with a thorough literature review, development of items with child development experts from different backgrounds, and pilot testing with a sample of the target population. While the process of validating requires assessment of its reliability and validity in a targeted population.

To the best of our knowledge, the current thesis was the first to validate two questionnaires for such a young age group. Parent reports were used to validate an existing empathy questionnaire (original language Dutch) for Portuguese children **(chapter 4**), and to develop and validate a questionnaire that measures three moral emotions distinctively (i.e., shame, guilt, and pride; **chapter 7**) in the preschool age. The validation of these questionnaires not only contributed to the current body of work by ensuring that the measures used were both reliable and valid, but are also an important contribution for future research that targets social emotions within a similar age group.

THE MICROSYSTEM - THE IMPACT OF THE PHYSICAL AND SOCIAL ENVIRONMENT

Physical environment

All DHH children in this thesis lived and were tested in Portugal during a period of 5 years (2017-2022). DHH children and their parents were recruited in two hospitals in Lisbon and asked to participate in this study during their hospital visit. Caregivers of the DHH children indicated the preschool that their child attended, and only when the parents gave their permission the preschool was contacted and asked to participate. All indicated preschools and caregivers of preschoolers in the same classes as the DHH child were asked to participate. All participating preschools were mainstream and the control group of the current study was composed of classmates of our DHH participants, who were all hearing children.

The majority of DHH preschoolers in our sample were CI users who were early-bilaterally implanted. In Portugal, cochlear implants are now the most commonly used device for children who have severe to profound hearing loss, allowing DHH children to have access to a wider range of auditory information compared to conventional hearing aids (Basura et al., 2009; Naik et al., 2021; Rich et al., 2013). However, even with all these new technologies DHH children in the current study were still engaging less than their hearing peers, similar to the outcomes found in studies that were conducted 25 to 45 years ago (see Antia et al., 2012, for a review). Yet, it is important to realize that interactions between children and their microsystem are bidirectional (Bronfenbrenner, 1979), and thus efforts in auditory rehabilitation become insufficient if the characteristics of the microsystem are not considered and adapted where necessary.

The physical environment of the playground - which is part of the microsystem - can make or break interactions between the child and the peer group, however its importance is often ignored in terms of research but also by stakeholders (e.g., teachers, therapists, caregivers). For example, playgrounds often have poor acoustics, which can feel overwhelming for DHH children. Indoor or covered play areas might increase echo and reverberation which can hinder DHH children from being able to join in with their peers, as they might simply not be able to hear them (NDCS, 2015). Additionally, smaller playgrounds might be too crowded with groups of hearing children generating a lot of

background noise, which might contribute to DHH children's preference for peripheral areas (Brunnberg, 2005; NDCS, 2015). Therefore, in this context DHH preschoolers may struggle to pick up auditory information, locate sounds, and follow conversations, which is not only very challenging but can justify the fewer opportunities that DHH children have to join and sustain interactions with their peers.

Social Environment

Additionally, peer actions – and reactions - may also play an important role. Many previous studies show that DHH children often experience social isolation and exclusion when they are on the playground (Deluzio & Girolametto, 2011; Guralnick et al., 2006; Levine & Antia, 1997). Although some of these behaviours may arise from the fact that some hearing children may exclude DHH children just from being different, others may exclude DHH peers unintentionally due to lack of awareness on what it takes to interact with a DHH peer in a noisy environment, such as playgrounds, and fast-changing dynamics, such as play. With most DHH children currently integrated into mainstream education, they are often surrounded by hearing children who effortlessly communicate with each other, while communicating with the DHH child takes more effort. For example, hearing preschoolers need to understand that DHH preschoolers need to see who is speaking and clearly see the face of who is speaking, so they can (additionally) lip read. Additionally, they must recognize the importance of turn-taking when having conversations with DHH peers. However, awareness of all these aspects is particularly challenging for young children, and thus need to be reinforced by other elements of the microsystem such as caregivers and teachers.

THE MESOSYSTEM – PRACTICAL SUGGESTIONS FOR THE COORDINATION OF THE ELEMENTS OF THE MICROSYSTEM

While the current thesis provides a fairly positive scenario regarding socioemotional development of DHH preschoolers, our findings also suggest that targeted interventions with the DHH children, their peers, and the context are needed to promote their social participation within the peer group. Importantly, the current findings show us the importance of the coordination between macro and microsystems. Macrosystems include the attitudes and ideologies that society has towards a specific individual and their characteristics (Bronfenbrenner, 1979). Focusing on DHH children, macrosystems are of

particular importance since they guide policies regarding healthcare, education and intervention, directly impacting DHH children's microsystems. For example, changes in ideologies now prioritize attendance of DHH children in mainstream schools. Furthermore, changes in ideologies have also contributed to access of DHH children with profound hearing loss to two CIs, rather than just one. However, most of the policies are directed towards the individual - and fixing the hearing loss - rather than also targeting the microsystem that surrounds the DHH child. Thus, based on the current findings we suggest a few changes in the microsystem and at the policy levels that could positively contribute to DHH children's social overall development.

First, and most important as this forms the basis for all other kinds of interventions or policies, the physical environment of the playground should be addressed first of all to ensure equity. Thus, (re-)structuring of the physical environment of the playground should take into consideration the experiences of DHH children in their design. Fundamental changes such as reducing visual barriers and creating a better acoustic environment, would provide these children with better access to visual and auditory information which in turn could increase their social participation. Furthermore, also in the context of preschool, teachers may take a proactive role in creating a more inclusive social environment, for example creating more awareness of hearing children on how to effectively communicate with a DHH child, through play (e.g., role play) or educational activities.

Second, exercise play is a promising tool for initiating and maintaining interactions between DHH preschoolers and their hearing peers **(chapters 2 and 3)**. Therefore, play based interventions within the peer group (e.g., psychomotor therapy) can play an important role for the social participation of DHH preschoolers. The fact that exercise play is based on movements rather than words creates a common ground for the DHH and hearing peers to communicate and interact. By 'levelling the playfield' for DHH children, exercise play helps the children within the peer group to get familiar with one another, gain more confidence for future interactions, and learn about each other's interest.

Third, DHH preschoolers in the current study exhibited lower language abilities – specifically in language comprehension, production and pragmatics - than their hearing peers **(chapters 5 and 8)**. A first suggestion to combat these differences would be to use

pretend play-based intervention in the preschool setting. Research over the years has found positive associations between engagement in pretend play and language skills (Brown et. al., 2001; Lillard, 2013). Therefore, pretend play facilitated by an adult might positively contribute to language abilities of DHH children while also helping them engage more spontaneously in pretend play in the outdoor playground. Currently, policies for follow-up intervention of DHH children including speech therapy is available in the public health system in Portugal for a mandatory duration of 6 months (Box 1 in Chapter 1). However, the guidelines for speech therapy beyond this period are not well defined, and also not equally accessible for all DHH children. Thus, it would be worthwhile that governmental policies extend the public speech therapy program so that DHH children have equal and better opportunities to ensure optimal development of their language skills, independently from their socioeconomic background.

Fourth, emotion vocabulary was less used by DHH preschoolers **(chapters 5 and 8)**. Since emotion vocabulary was revealed as an important aspect for empathy in both groups, it is important to raise awareness about the importance of creating opportunities for children to learn about emotions and mental states at home and also in school settings. For example, teachers and parents can be taught how to facilitate pretend play and add more emotion vocabulary and mental states language in their daily social interactions.

THE MACROSYSTEM – AUDITORY REHABILITATION POLICIES IN PORTUGAL

Although DHH and hearing preschoolers differed in their hearing status, our results showed that hearing factors were unrelated to emotional functioning and social skills (Chapter 5 and 8). DHH children in our study performed equally to their hearing peers, which was a more positive scenario compared to previous studies (e.g. Ketelaar et al., 2012, 2015; Kouwenberg, 2013; Tsou et al., 2021).

While reflecting on possible contributing factors for these positive differences, we noted that the majority of DHH preschoolers in our sample were CI users, which are now the most commonly used devices for children who have severe to profound hearing loss in Portugal, allowing DHH children to have access to a wider range of auditory information compared to conventional hearing aids. Furthermore, whereas all CI users in

our sample were treated early and bilaterally, a number of DHH children in previous studies received hearing intervention later and only in one ear (e.g., 33% in Netten et al., 2015, & in Ketelaar et al., 2012). Note that the majority of previously mentioned studies who focused on social functioning of DHH children derive from Dutch samples (e.g., Ketelaar et al., 2013, 2015; Netten et al., 2015; Wiefferink et al., 2012), while participants, in the current study were all diagnosed with hearing loss after the Portuguese government implemented the policies for early and bilateral intervention (Box 1).

Therefore, the positive outcomes regarding socioemotional competence of DHH children in the current sample align with research conducted during the last decade, that indicates that DHH children who benefit from early auditory restorative intervention show better outcomes in their communication and neurocognitive development (Geers & Nicholas, 2013; Naik et al., 2021; Nikolopoulos et al., 1999). Furthermore, DHH children who are treated bilaterally have better speech perception, less difficulties in locating where sounds are coming from, and rely less on visual cues to gain access to social information, compared to children with unilateral rehabilitation (see Gordon et al., 2013, for a review).

In sum, these factors collectively provide earlier and better access of DHH children to the auditory environment, facilitating incidental and social learning, especially in the family environment during the early years. This aspect may have been crucial for the positive outcomes observed in the current study regarding DHH preschoolers' emotional development.

LIMITATIONS AND FUTURE DIRECTIONS

Before concluding this thesis, several limitations that might be addressed in future studies will be discussed. First, the included studies were limited to a relatively small sample size of Portuguese DHH preschoolers (n = 32). As such, it would be important that future studies replicate the current work with a larger sample size to confirm the robustness of the findings with a more representative sample of the DHH population. Moreover, besides a large number of participants a more heterogeneous representation of DHH preschoolers is also recommended. For example, all preschoolers in the current study used spoken language as their primary mode of communication, which is not true

for all DHH preschoolers who can opt for sign or bilingual modes of communication. DHH children who do not use spoken language might have a different social experience—and engagement—than the DHH children included in this study. Therefore, future studies could also include DHH children who primarily use sign language, or sign-supported language, to understand how different communication modes influence the social participation of DHH children within the peer group. Furthermore, a bigger sample would also allow us to take into consideration individual differences regarding the family context, such as quality of interaction with caregivers and siblings, which are known to contribute to socio-emotional development.

Second, all of the participating DHH children were the only DHH child in their class, and had only hearing peers available to interact at school. Previous research has shown that DHH children in mainstream schools still prefer to engage in interactions with similar peers, which might have contributed to more solitude in the playground setting. Future studies should focus on schools where DHH children have both DHH and hearing peers available for interaction. The presence of DHH peers on the playground may enhance social engagement among DHH preschoolers in the playground setting.

Third, naturalistic observations were the only method used to obtain information regarding preschoolers' social functioning in the playground setting. While observations provide specific insights into children’s activities and interactions, this method is very time-consuming, and it only allows limited fragments of the children’s spontaneous playground interactions to be captured. Incorporating new methodologies, such as sensor data, could offer more insightful information into playground behaviours by capturing spontaneous behaviour, continuous and precise data collection. Future studies should combine observation data with these new technologies to better understand the social participation of preschool DHH children in playground settings.

Fourth, all the studies were cross-sectional, limiting our opportunity to draw causal relations and confirm if the current outcomes persist throughout childhood and adolescence. Therefore, the last recommendation is that future studies apply a longitudinal approach thus allowing us to understand how social functioning evolves over time.

Lastly, children's lived experiences at the playground were not included in the current thesis. That is, our concerns over the fewer social interaction that DHH preschoolers had in the playground setting, are based on our own expectations of children's development and the comparison with hearing children. However, it could very well be that the fewer interactions are a reflection of the DHH child's own desire. Thus, future studies should measure how children feel about their experiences at the playground and how connected they feel with the peer group, in order to draw more accurate conclusions.

CONCLUSION

The current thesis aimed to provide the status quo of social functioning – and interrelated factors – of Portuguese DHH preschoolers in relation to their hearing peers. The current findings showed that the level of socioemotional development of DHH preschoolers in all domains that were included in this thesis, was comparable to that of their hearing peers, and that similar relations were found in both groups regarding social and emotional functioning. Yet, DHH children still encountered challenges when trying to interact with their peers in the playground setting. These findings suggest that views that attributed problems in interaction to socioemotional difficulties of DHH children need to be challenged. Furthermore, there is a need to look beyond the child, and into the micro-meso-exo-macrosystems (Figure 1) around them when drawing conclusions regarding DHH preschoolers social functioning.

Importantly, the current thesis highlights the importance of differentiating between inclusion and equity for DHH preschoolers in mainstream settings. Inclusion refers to the practice of integrating DHH children into mainstream classrooms, ensuring they participate alongside their hearing peers. This involves providing access to the same educational activities, resources, and social opportunities. However, inclusion alone does not guarantee equity. Equity goes further by addressing the specific needs of DHH preschoolers to ensure they have the same opportunities for success as their hearing peers. This might involve specific support such as (re-)building a physical environment that is not auditory overwhelming for them, and supporting the use of sign language, and modified teaching strategies that accommodate their unique learning styles. While

inclusion focuses on presence and participation, equity emphasizes fairness and the provision of appropriate resources to overcome barriers, enabling DHH preschoolers to achieve their full potential in mainstream settings.

To date, most DHH preschoolers are ‘included’ in their microsystems, and yet equity is still missing, and this - rather than their intrinsic characteristics - seems to push them away from their peer group. Specifically, daily challenges of DHH preschoolers should be taken into consideration when designing playgrounds. Additionally, teachers and caregivers should be supported on their emotion communication with DHH children. Teachers and caregivers have a significant role in facilitating implicit emotional learning for DHH children, since these children will model the way that primary adult figures interact and handle their emotions. Nevertheless, while providing teachers with strategies to better communicate with DHH children, they can better raise awareness from peers on how to communicate with DHH children, through play or other child-friendly methods.

To conclude, the outcomes of this thesis challenge the initial assumptions on aspects that could hinder social functioning of DHH children. For many years, research has put DHH children's intrinsic characteristics and development in the centre of this complex problem, without considering that they could be ‘blaming the victim’.

Personally, I hope that the current work also challenges others to continue to understand how we - as a society - can collectively make changes within the environment and within ourselves to promote equity of DHH preschoolers and allow them to develop in the same way their hearing peers typically do: by spontaneously interacting with the social world around them.

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Chapter 10

Lay Summary

Social functioning is crucial for children's overall development, as social interactions are the means through which children learn about emotions, form connections, and acquire social norms (Bedell & Dumas, 2004; Law, 2002; Saarni, 1999). Deaf and Hard-of-Hearing (DHH) children often face challenges in social interactions because they live in a world primarily designed for hearing people, with these challenges persisting even after receiving hearing aids or cochlear implants, as these devices are not comparable to natural hearing (Jiam et al., 2017; Pisoni et al., 2017). As a result, DHH children may have fewer opportunities to learn from everyday social interactions, which are vital for developing social and emotional skills (Bandura, 1977; Kelly, 2012).

Playground interactions provide valuable insights into children's social functioning, as the way children play and interact with peers in a natural setting, is a reflection of their social behaviors and skills (Heravi et al., 2018; Veiga et al., 2017). However, studies show that DHH children often spend more time alone on the playground, preferring to observe others rather than join in(Levine & Antia, 1997; Vandell & George, 1981) . This tendency may stem from a fear of rejection or difficulty in understanding social cues (Levine & Antia, 1997; Vandell & George, 1981). As a result, DHH children may miss out on important social learning experiences, which can hinder their ability to form meaningful connections with peers (Henderson et al., 2004; Kouwenberg et al., 2012; Peterson et al., 2016).

Furthermore, one aspect that is particularly challenging for DHH children is free play situations, which mostly occur in noisy and unstructured playgrounds. Play is recognized as a fundamental right for children and is essential for their development (Montessori, 1989; Pellegrini, 2009; Piaget, 1951; Vygotsky, 1967). However, DHH children seem to avoid certain types of play particularly those that require strong communication skills, such as pretend play (Brown et al., 2001; Levine & Antia, 1997). Physical play, which involves less verbal communication, may be more accessible to DHH children and could help them develop social skills and maintain interactions (Higginbotham & Baker, 1981). Despite these assumptions, there is limited research on play and playground behaviours of DHH preschoolers with most existing studies dating from more than 25 years ago (Antia et al., 2012).

More up-to-date is research on social emotional developmental of DHH children, which has consistently shown that DHH children face more social and emotional difficulties compared to their hearing peers (Kouwenberg, 2013; Rieffe, 2012; Stevenson et al., 2015). DHH children are often reported to struggle with identifying and regulating emotions, but also acquiring social norms and showing prosocial behaviours which are important for navigating social relationships in everyday life. These difficulties can lead to behavioural problems such as aggression or social withdrawal (Ketelaar et al., 2013; Rieffe et al., 2005; Rieffe & Terwogt, 2006). All these different challenges seem to occur due to limited opportunities for social learning that DHH children face in their daily lives, which are crucial for developing social-emotional competence.

RESEARCH AIM

Considering the importance of early social interactions, particularly in preschool age, the current work seeks to understand DHH children's social-emotional functioning compared to their hearing peers. By focusing on play and playground behaviours, social-emotional competence, the thesis wants to contribute to the theoretical body of work regarding DHH preschoolers social functioning and its interrelated factors. **The practical aim of the current work is to provide insights and strategies aimed to promoting social integration and equity for DHH children.**

SUMMARY OF FINDINGS

DHH preschoolers in the current study showed more solitary behaviours on the playground than their hearing peers, in line with previous studies (Levine & Antia, 1997; Vandell & George, 1981). However, contrary to our initial expectations, these non-social behaviours were unrelated to their overall competencies, as these were comparable to their hearing peers. Specifically, outcomes related to externalizing problems, aggression, and prosocial behaviours showed no differences between DHH preschoolers and their hearing peers of the same age (Chapters 5 and 8). Furthermore, both groups showed similar levels of empathy (Chapter 5), shame, and guilt (Chapter 8), and were equally capable of decoding others' emotions and regulating their own (Chapter 5). The positive

outcomes in social and emotional development for deaf and hard-of-hearing (DHH) preschoolers in this study may be attributed to several factors. Most DHH children in the sample used cochlear implants (CIs), which offer more auditory access than conventional hearing aids. These children also received early, bilateral intervention, unlike those in previous studies who were treated later or in only one ear (e.g., Ketelaar et al., 2013, 2015; Netten et al., 2015; Wiefferink et al., 2012). Early and bilateral treatment allows better speech perception and reduces reliance on visual cues, leading to improved communication, neurocognitive development, and most likely facilitated social learning and emotional development (Geers & Nicholas, 2013; Naik et al., 2021; Nikolopoulos et al., 1999).

The only aspect where DHH and hearing children were not comparable was regarding language skills, with DHH children showing lower general language skills (comprehension, production, and pragmatics) and lower emotional language skills than their hearing peers (Chapters 5 and 8). However, our findings show that language skills do not play a major role in DHH children's social-emotional competence (Chapters 5 and 8), and these difficulties do not hinder DHH preschoolers from engaging in conversations with their peers, which was one of their most prevalent playground activities (Chapter 3).

Altogether, the current findings suggest that the difference in playground behaviours between DHH and hearing children stems from the influence of extrinsic factors within their microsystem, rather than intrinsic characteristics. Inspired by Bronfenbrenner's (1979) social-ecological model, we discussed how the intrinsic characteristics of DHH children and extrinsic factors in their environment influence their social functioning.

The physical-social environment

All DHH children in the current study attended mainstream preschools, where their classmates were all hearing children. Furthermore, majority of the DHH children in this study used cochlear implants (CIs), which are devices that help them hear better than traditional hearing aids (Basura et al., 2009; Naik et al., 2021; Rich et al., 2013). Despite these advanced devices, DHH children still interacted less with their peers than children with normal hearing, similarly to findings from studies conducted 25 to 45 years ago, when CIs were not widely available (Antia et al., 2012).

Thus, this should make us aware that it is not just about having more sophisticated technology, the environment may also play a key role. As previously mentioned, playgrounds are one of the main contexts for peer interactions however, they often have poor acoustics that make it hard for DHH children to hear and understand others. This can make them feel overwhelmed and lead them to play away from the main group of children (Brunnberg, 2005; NDCS, 2015).

Besides the physical characteristics, peer attitudes also can make an impact. Previous research shows that DHH children often feel isolated or left out during play (Deluzio & Girolametto, 2011; Guralnick et al., 2006; Levine & Antia, 1997). Some hearing children may not understand how to communicate effectively with DHH children, especially in noisy environments like playgrounds, and may unintentionally exclude them. To improve interactions, it is important for everyone involved—like teachers and caregivers—to understand these challenges and actively help DHH children participate more fully in play and social activities.

FINAL CONSIDERATIONS AND PRACTICAL IMPLICATIONS

In summary, despite DHH children often facing barriers, both intrinsic (like difficulties with speech perception) and extrinsic (such as noisy environments), their resilience – together with progress in regards to educational and rehabilitation policies – allow for comparable emotional development with their hearing peers. Our findings highlight the unique social challenges faced by DHH preschoolers, and the need to look beyond intrinsic aspects, and further consider the weight that the physical social environment plays on access to social learning opportunities of DHH children.

The research emphasizes the need for better-designed playgrounds and targeted interventions in the preschool setting, with the peer groups but also teachers to improve DHH children's social participation. Practical implications include restructuring physical environments, promoting inclusive social practices among peers, and enhancing language support through play-based interventions. Future studies should include more diverse representation of DHH preschoolers (e.g. who primarily use sign language; whose caregivers are also DHH; who attend special education schools) which may bring more awareness into how nuances regarding rehabilitation and communication mode may

impact social functioning of DHH preschoolers. Furthermore, longitudinal research and the inclusion of DHH children's own perspectives on their social experiences in the playground setting, and school in general are also aspects to be considered in the future. For example, a study conducted throughout the duration of the school year - or even the duration of preschool years - could inform about how social behaviours with peers evolve across time. Additionally gathering information about how children feel while at the playground, could inform us about how connected they feel with the peer group.

Lastly, the current thesis presented alternatives for improving data collection with young children, by combining traditional methods with technology to improve data collection and validating new assessment tools for caregivers (chapters 3 & 6). More specifically, playground behaviours were observed using a software specifically designed for studies who aim to understand these interactions (chapter 3), while peer preferences were assessed with a computerized sociometric assessment tool (Endedijk & Cillessen, 2015). Furthermore, caregivers reports were used to validate an existing empathy questionnaire (original language Dutch) for Portuguese children **(chapter 4**), and to develop and validate a questionnaire that measures three moral emotions distinctively (i.e., shame, guilt, and pride; **chapter 7**) in the preschool age. The validation of these questionnaires, and the suggested methodologies not only contributed to the current body of work by ensuring that the measures used were both reliable and valid, but are also an important contribution for future research that targets social emotions within a similar age group.

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Appendices

Supplemental Material Chapter 4

S.4.1 – Differences between peer preference assessment with 45 and 80 pairs

In order to assess Peer Preference, a computerized assessment of paired comparison was conducted (Endedijk and Cillessen 2015). On the day of the assessment, an individual picture of each child from the class was taken and uploaded to one tablet. All pictures were numbered where each child was assigned a specific number on the classroom list. The experimenter would call each child to a separate room, and present the tablet to run the experiment. To introduce the task, children were presented with pictures of a pair of toys on the screen and the experimenter asked the child to touch the toy that he/she liked to play with the most. Once it was clear that the children understood how this worked, the experimental task started.

During the experiment, pairs of photos of classmates were presented on the screen, and the experimenter would ask the child "which one of these children do you like to play with the most?". The child was again asked to indicate his/her preference by touching the screen, after which another pair of photos would be presented. Initially the maximum number of pairs (with random matching of photos of all children in the classroom; no pairs were repeated, thus all pairs presented were unique combinations) that were to be shown to each child was set up to 80, but after the first four data collection sessions, it was clear that the younger children were distracted and uneasy after 40/50 pairs of the experiment. Therefore, the maximum number of pairs presented was adjusted to 45 to ensure that all children were focused. The first 29 children to perform the experiment saw 80 pairs and the remaining 106 children saw 45. To test whether the average results for children who performed the task after viewing 45 pairs and 80 pairs, the participants were divided by into two groups and t-tests were conducted. Our results revealed no significant differences in the average peer preference score between groups ($t(133) = -.906$, $p = .183$), therefore we maintained all results in our analysis.

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Curriculum Vitae

Brenda de Sousa da Silva was born in 1991 in Benguela, Angola. In 2009 she graduated from Colégio de Albergaria, and then went on to pursue her bachelor in Psychomotor Rehabilitation from University of Évora, and a Master's degree in Psychomotor Rehabilitation at University of Lisbon in 2014. Brenda has completed her training in clinical settings with children with mental health problems, related to emotional problems. She has also worked with adults with addiction disorders and mental health problems. In 2016, Brenda started her PhD at the Developmental and Educational Psychology unit of the Institute of Psychology at Leiden University, within the Focus on Emotions lab under the supervision of Prof.dr. Carolien Rieffe, Prof.dr. Berna Güroğlu, Prof.dr. ir. Johan H.M. Frijns (LUMC, Leiden) and Dr. Guida Veiga (University of Évora, Portugal). Brenda's PhD project focused on play, socialization and emotional development in children with and without hearing loss. The aim of the project was to better understand how hearing loss can impact on social participation of children within their peer group. Since 2019 her research project has been financed by the Portuguese Foundation for Science and Technology (FCT 2019 Studentship Grant SFRH/BD/144768/2019). Currently Brenda is coordinator of research projects in a private solidarity institution that shelters people/families who suffer from social vulnerability. Her role is to conduct and partner in research projects aimed towards improving services provided to those in need, but also maintain synergies with Portuguese government to promote changes in national policies regarding vulnerable people.

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