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

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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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