Reflect, (re)act and interact: the roles of shame, guilt and social access in adolescent aggression
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REFLECT REACT AND INTERACT

The roles of shame, guilt and social access
in adolescent aggression

Evelien Broekhof

REFLECT, (RE)ACT AND INTERACT

The roles of shame, guilt and social access in adolescent aggression

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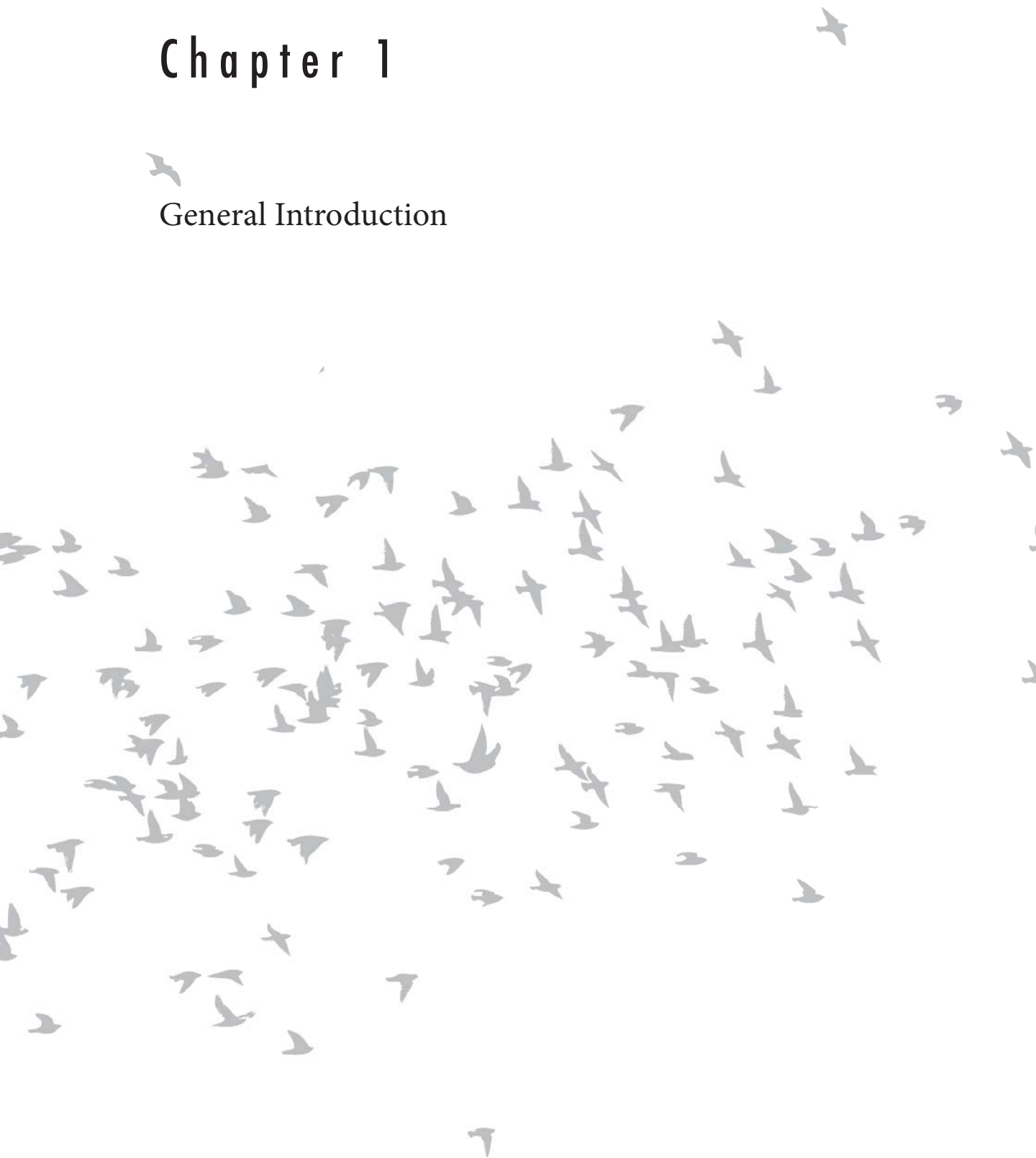Dr. M. Camodeca (University of Udine)

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Chapter 1

General Introduction

"One of my classmates, Jennie, wanted to apply to Art College. For weeks, she had been working on a still life to use in her application. One day, I walked through art class with a jar of dirty water in my hands. While I was absorbed in a conversation with a friend, I tripped over someone's bag. The jar fell out of my hands, onto Jennie's painting, which was now completely ruined. To make matters worse, everyone seemed to be watching me while falling on the floor. I got up as fast as I could, and saw Jennie's reaction. She was staring at her painting, looking horrified. I felt terrible!"
(Paul, 15 years old)

You might be able to imagine how Paul was feeling in this situation. Most people have been in situations where they inflicted harm on someone, or felt like everyone was looking at them while they behaved incompetently - especially during the teenage years. When it happened, you immediately (and unconsciously) recognized the unpleasantness of the situation. Whether you were aware of it or not, you experienced an increase in physiological arousal: your heart suddenly began to beat faster and your breathing quickened. Nothing else mattered at that moment, as your attention was fully focused on the arousing situation (this is called *primary appraisal*; see Box 1 for a more detailed description on Appraisal Theory). Your body was prepared for action.

But if you were in Paul's position, what would your next move be? There are several behavioural options. You could run away, start crying, or apologize to Jennie. People are motivated to select the option with the most favourable outcome (this is called *secondary appraisal*; see Box 1 for a more detailed description on Appraisal Theory) and most of us decide which behaviour is the most favourable by considering the consequences. You could consider the consequences for running away: imagine what would happen if you were to walk away unmoved by the previous events. How do you think Jennie would react? It is plausible that she would become angry about your indifference. Your relationship with Jennie could be damaged. In addition, bystanders would not approve this kind of inconsiderate behaviour.

However, Jennie's reaction would probably be very different if you were to show that you felt sorry for what you had done, by apologizing, mentioning you did not do it on purpose, or offering help to restore the painting (even though this would probably be impossible). The extent of the damage to the painting would be the same as in the previous behavioural alternative. However, Jennie might be more willing to forgive you, and be less angry at you, if you were to show that you were sorry for the damage you caused than if you were to walk away in an unaffected manner. In addition, showing how sorry you are signals to bystanders that you are aware you have messed up. Others would be less inclined to attribute your transgression to your personality and would judge the chance of you repeating that behaviour as low. Based on these projected

outcomes, you will be likely to prefer the option of making amends, over the option of walking away as if nothing had happened.

   The emotions associated with the situation described above are typically labelled as self-conscious emotions. Self-conscious emotions result from an evaluation of one's own behaviour, in light of external social rules and moral standards. To experience self-conscious emotions, individuals must evaluate their behaviour through the eyes of others (Buss, 2001; Tangney & Dearing, 2002). In the example story, Paul behaved imprudently: he was chatting with a friend while walking around in an art class with a jar full of dirty water that could damage others' paintings. Paul violated the moral and societal standard of not causing harm or disadvantage to others. Hours of hard work were lost. Jennie needed to start all over again, perhaps without being able to copy or achieve the quality of the previous result. Paul felt responsible for this harm, while at the same time, he was worried about how bystanders might judge his harmful and clumsy behaviour.

Box 1. Appraisal Theory

Evaluations and interpretations (i.e., appraisals) of events influence whether an emotion will be experienced, which emotion will be experienced, and with what intensity. This is nicely illustrated in *the structural model of appraisal* of Richard Lazarus (Lazarus, 1966, 1991). The model differentiates between two different categories of appraisal: primary appraisal and secondary appraisal.

The **primary appraisal** consists of two appraisal components: *motivational relevance* and *motivational congruence*. *Motivational relevance* concerns the appraisal whether a situation is relevant to one's well-being and personal goals. As Richard Lazarus states: "*we do not become emotional about unimportant things, but about values and goals to which we have made a strong commitment*" (p. 819, Lazarus, 1991). In other words, an emotion is only elicited if one appraises a situation as relevant to one's well-being and personal goals. *Motivational congruence* refers to an appraisal whether the situation is congruent or incongruent with one's personal goals. If one appraises a situation as being congruent with one's personal goals, it will result in positive emotion experiences. Whereas if one appraises a situation as incongruent with one's goal, it will pave the way for negative emotion experiences (Lazarus, 1966, 1991).

Box 1 - Continuation

The **secondary appraisal** involves an evaluation of one's options and resources for coping and will guide one's future efforts to cope with the arousing event. The secondary appraisal consists of four components: (1) *Accountability*. Who or what is accountable for the arousing event? This component will identify the target to blame (in case of motivational incongruence) or to give credit (in the case of motivational congruence). (2) *Problem-focused coping potential* refers to whether one has the ability to change or accommodate the situation to make it more congruent with one's personal goals. This judgment is highly influenced by a person's belief about one's own abilities. (3) *Emotion-focus coping potential* refers to the evaluation whether one can adapt emotionally to the arousing situation, by altering one's appraisals (reappraisal), desires or personal goals. (4) *Future expectancy* reflects the belief that changes can occur in the actual or psychological situation, making the arousing event more congruent with one's personal goals (Lazarus, 1966, 1991).

This structural model of appraisal demonstrates how specific patterns of appraisal shape different emotion experiences and reactions. For example, someone who is sad is likely to appraise an event as motivationally relevant and motivationally incongruent, and to judge oneself low in problem-focused coping potential. Whereas someone who is angry, also appraises a situation as motivationally relevant and motivationally incongruent, but focusses more on other-accountability and judges oneself high in problem-focus coping potential (Smith & Lazarus, 1993).

Self-conscious emotions

Self-conscious emotions constitute a special class of emotions as they have unique features that clearly distinguish them from other emotions (Tracy & Robins, 2004, 2007). Foremost, they have a strong self-evaluative component. Self-conscious emotions will only be elicited if attentional focus is addressed to the self and if one appraises a situation as relevant to one's identity goals (*motivational relevance*; see box 1). To illustrate, for self-conscious emotions to occur, one must reflect on one's self-representations. If one holds the self-representation of being a nice person, offending someone might result in emotions of shame and guilt, which are examples of self-

conscious emotions (for differences between shame and guilt, see box 2), whereas, organizing a fund-raising event, might result in pride. Note that basic emotions can also occur due to self-evaluative processes, but self-conscious emotions cannot occur in the absence of self-evaluation. Consequently, self-conscious emotions are cognitively more complex than basic emotions and therefore develop later in childhood (Tracy & Robins, 2004, 2007).

In addition, self-conscious emotions serve an important function in facilitating the attainment of complex social goals (Tracy & Robins, 2004, 2007). Self-conscious emotions promote the maintenance and enhancement of one's social status, and group acceptance. Negative self-conscious emotions indicate that the attainment of these social goals is threatened, whereas positive self-conscious emotions indicate socially valued success. Self-conscious emotions provide immediate punishment and/or reward for certain behaviours and motivate individuals to behave appropriately within the social context. Therefore, shame, guilt and pride are also referred to as social emotions or moral emotions (e.g., Beer, Heerey, Keltner, Scabini, & Knight, 2003; Tangney et al., 2007; Tracy & Robins, 2004, 2007).

Box 2 - Shame and guilt

Negative self-conscious emotions, such as shame and guilt, are only elicited if one appraises a situation as a threat to one's identity goals (*motivational relevance* and *motivational incongruence*). Shame and guilt therefore both typically arise as a consequence of violating a social standard, rule or goal (Tangney, Stuewig, & Mashek, 2007). Both emotions only occur if one holds oneself accountable for the situation (Tracy & Robins, 2004, 2007). However, the causal attributions of the internal cause differentiate between shame and guilt (Tangney & Dearing, 2002). The causal attributions of shame and guilt differ in *stability* (stable/ unstable), *controllability* (controllable/incontrollable) and *globality* (global/ specific; see Figure 1).

Shame involves the concern with being negatively evaluated by others: one fears being viewed by others in a way one does not want to be viewed (Olthof, 2012). Stable, uncontrollable and global attributions about the cause of a situation lead to shame (e.g., "*I am stupid*"). Because individuals tend to attribute their failure to deficiencies of the global self, shame is a very painful emotion that causes

Box 2 - Continuation

individuals to feel bad about themselves (Tracy & Robins, 2004). Shame is accompanied by the urge to escape from the situation, in order to hide the defective self from the outside world. This is manifested by avoiding eye-contact with others, and a collapsed body posture (Lewis, 1992; Mills, 2005; Tangney & Dearing, 2002).

Guilt, on the other hand, involves the concern that one is responsible for harm caused to another by one's actions (Tracy & Robins, 2006). Unstable, controllable and specific attributions about the cause of a situation lead to guilt (e.g., "*I did something stupid*"). Like shame, guilt also entails a negative evaluation, but this evaluation is limited to one's transgression: one feels bad about what one did. Guilt facilitates reparative acts toward the individual who was wronged by the immoral or irresponsible act (Lewis, 1971; Lindsay-Hartz, 1984; Tangney & Dearing, 2002).
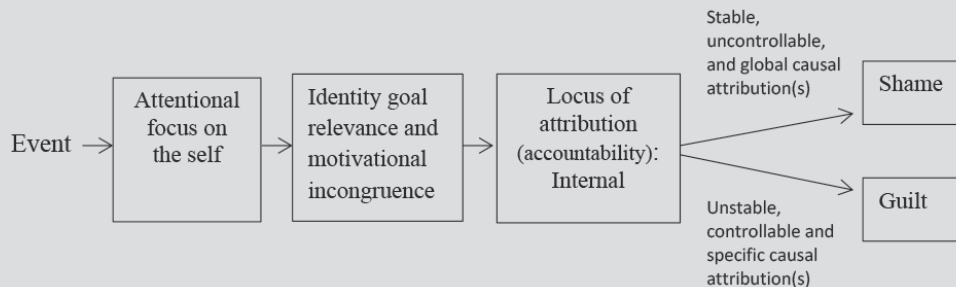
Figure 1. A simplified version of the process model of self-conscious emotions, including shame and guilt, from Tracy and Robins (2004).

The development of self-conscious emotions

The capacity for experiencing self-conscious emotions is not innate; these emotions are cognitively complex and learned within a social context (Tracy & Robins, 2007). Children need to acquire three main cognitive skills before they can experience self-conscious emotions: (1) a sense of self awareness, the formation of stable representations, and the ability to direct attentional focus to the self; (2) knowledge about social rules and social standards and the capacity to evaluate one's own

behaviour against these standards, rules, and goals; and (3) perspective taking abilities to imagine how one is evaluated by others (Muris & Meesters, 2014; Tracy & Robins, 2007). Children around three years of age start to experience shame and guilt at a very basic level. These abilities continue to develop and refine throughout childhood, and this continuous development is largely dependent on verbal input from the social world (Lagattuta & Thompson, 2007).

First, a basic self-awareness develops around two years of age, when children recognize themselves in the mirror and when they start to make verbal self-referential statements (e.g., me, mine; Lewis & Brooks-Gunn, 1979; Thompson, 2006). Second, around the first year of age children start to become aware which behaviours are socially appropriate and which are not. At this age, children start to engage in self-referential behaviours: children look to see the reaction of others, to see how behaviours, objects, persons, and/or situations are evaluated. Others – typically parents, in this stage of life – will display negative affect, use imperative language, and use a negative affective tone when the child engages in unwanted behaviours (e.g., dangerous or aggressive behaviour), and display positive affect and adopt a positive emotional tone when the child achieves a new skill or behaves according to the rules. In this way, children learn at a young age how their behaviour is evaluated by others. This builds a foundation for the understanding of social rules and social standards (Lagattuta & Thompson, 2007; Thompson, Meyer, & McGinsley, 2006). Around the age of three, children are also able to evaluate their behaviour according to these social rules and standards (Kagan, 2005). As children become more proficient in language, they learn to rapidly recognize and understand social rules and social standards, through direct parent-child interactions (e.g., Fivush & Nelson, 2006).

Third, to experience self-conscious emotions, children also must learn to imagine how others might evaluate them and their behaviour by taking others' perspectives. Shame involves the fear of being negatively evaluated by others, and guilt involves the feeling that one is responsible for harm or disadvantage caused to someone else as a result of one's actions. Thus, the experience of both shame and guilt require perspective taking abilities (Cutting & Dunn, 2002; Lagattuta & Thompson, 2007). Perspective taking abilities are often referred to as Theory of Mind (ToM). ToM understanding starts in the first year of life, when children start to acknowledge that others' actions are driven by their intentions. Later on, children around three- to four years of age develop a basic understanding of others' desires and beliefs (Peterson, Wellman, & Liu, 2005; Wellman, 1990). In line with this development, children of five years of age express more guilt than children of three years of age (Bafunno & Camodeca, 2013); and children with more advanced ToM knowledge are more sensitive to others' judgements (Cutting & Dunn, 2002). ToM development is highly reliant on input from

the social world. Parents foster children's ToM development by naming others' mental states ("*he likes carrots*"), providing verbal explanations about mental states, and also by stimulating perspective taking by the children themselves ("*how would you like it if someone did that to you?"*). Thus, the quality and quantity of parent-child conversations and children's level of language are closely associated with ToM development (e.g., de Villiers & de Villiers, 2014).

Even though five-year-olds have acquired the three main cognitive skills, other necessary cognitive abilities are still refined throughout middle childhood. During middle childhood, the experience of self-conscious emotions becomes more closely related to appraisals of accountability (*accountability*; box 1). This is nicely demonstrated in studies in which children were asked to imagine being the protagonist of a short story. The stories varied in the extent to which the protagonist was accountable for an achievement. Children were asked to report how proud the protagonist would feel in the described situation. While five-year-olds attribute the same degree of pride to an achievement due to an external factor (e.g., a good grade because the teacher is an easy grader) as to an achievement due to an internal factor (e.g., a good grade because I am smart; I studied hard), eight-year-olds attribute more pride to achievements due to internal factors than external factors (Graham & Weiner, 1991; Kornilaki & Chlouverakis, 2004.) During middle childhood, children also learn to more accurately describe situations that elicit self-conscious emotions. While five-year-olds are not able to do this, seven-year-olds get more skilful in describing these situations (Harris, Olthof, Terwogt, & Hardman, 1987), and also show the ability to differentiate between shame and guilt. They attribute shame primarily to situations in which one behaves incompetently without causing harm to another, and they attribute both guilt and shame to situations in which harm is inflicted to another (see box 2 for differences between shame and guilt). The knowledge of nine-year-olds about shame and guilt approximates that of adults; they associate shame with escape related action tendencies and blushing, whereas they associate guilt with remorse and the desire to make amends (Ferguson, Stegge, & Damhuis, 1991; Olthof, Schouten, Kuiper, Stegge, & Jennekens-Schinkel, 2000).

The experience of self-conscious emotions in adolescence is shaped by an elevated need for social acceptance. Adolescence is a developmental phase marked by tremendous social, emotional, and cognitive changes. Adolescents make a shift in social focus, as they start to seek and gain independence from their parents, while spending more of their leisure time with their peers, as compared to childhood. A strong desire to be accepted by their peers and to establish close and meaningful friendships emerges (Brown, 2004). Therefore, most adolescents attach great value to evaluations their peers make about them (Blakemore & Mills, 2014; Somerville, 2013). Proneness to self-

conscious emotions might be more pronounced in this phase, as adolescents are highly motivated to evaluate their own behaviour through the eyes of their peers (Reimer, 1996; van Hoorn, van Dijk, Meuwese, Rieffe, & Crone, 2016).

SOCIAL ACCESS AND SOCIAL LEARNING

Participation in the social world is of crucial importance for the development of self-conscious emotions. The ways in which children acquire knowledge about social standards, social rules and ToM are highly social processes. Children are dependent on language and communication with others for learning in their social environment (e.g., Eisenberg, Cumberland, & Spinrad, 1998). Difficulties in participating in communication could therefore interfere considerably with the development of self-conscious emotions.

Both adolescents with an autism spectrum disorder (ASD) and adolescents with hearing loss have less access to the social world compared to their typically developing peers. Adolescents with ASD have more difficulty with social language and experience more communication difficulties. Adolescents with hearing loss face challenges in communication due to their diminished access to sound. With hearing devices, adolescents with hearing loss can hear what is said in one-on-one conversations and in quiet environments. However, hearing what is said is challenging in environments with background noise (e.g., classrooms), in group settings, or when it is not directed towards them (Eisenberg, 2007; Finitzo-Hieber & Tillman, 1978; McCreery et al., 2015). In both adolescents with ASD and adolescents with hearing loss, the diminished access to social interactions could reduce the opportunity to learn from social experiences. In both groups, various emotional difficulties have been identified, including higher levels of anxiety and depression (Ambler, Fidels, & Gregory, 2015; DeFilippis, 2018; Theunissen et al., 2012; Theunissen et al., 2011). Yet studies examining the development of self-conscious emotions are scarce. **The first aim of this thesis is to examine the level of self-conscious emotions in adolescents with ASD and adolescents with hearing loss, as compared to levels of self-conscious emotions in typically developing adolescents.**

Self-conscious emotions in adolescents with ASD
ASD is a neurobiological developmental disorder with pervasive consequences for several areas of functioning. Individuals with ASD experience persistent difficulties in social interaction and communication skills. These social deficits involve deficits in the use and understanding of nonverbal communication (e.g., gestures and eye-

contact), problems in developing and maintaining age-appropriate peer relationships (Petrina, Carter, & Stephenson, 2014), and a lower level of social reciprocity (van Ommeren, Begeer, Scheeren, & Koot, 2012). In addition, a repetitive repertoire of behaviour and restricted activities and interests are part of the diagnostic characteristics (DSM 5; American Psychiatric Association, 2013). ASD is a lifelong disorder and symptoms become apparent in an early developmental period. Children with ASD around two years of age already show delays in early language and communication compared to their peers without ASD. Due to these social deficits and communication problems, participating in the social world is more challenging for children and adolescents with ASD.

How do self-conscious emotions develop in this group of children with severe social difficulties? To answer this question, we first need to consider an indispensable building block for the development of self-conscious emotions: ToM. Children with ASD have clear difficulties in the development of ToM, indicating that adolescents with ASD could be at risk for difficulties in the development of self-conscious emotions. A few studies have indeed indicated that adolescents with ASD experience less shame and guilt (Capps, Yirmiya, & Sigman, 1992; Heerey, Keltner, & Capps, 2003; Hobson, Chidambi, Lee, & Meyer, 2006).

Self-conscious emotions in adolescents with hearing loss
Adolescents with hearing loss (i.e., > 40 dB loss in the best ear) experience challenges in engaging in social interactions with their hearing environment, since they cannot overhear speech even at close distances. Even after they receive hearing amplification or are implanted with sophisticated devices such as a cochlear implant[1], difficulties with spoken communication remain (Eisenberg, 2007; Finitzo-Hieber & Tillman, 1978; McCreery et al., 2015). In addition, more than 90% of children with a hearing loss are born to hearing parents, who rely on spoken language for communication (Mitchell & Karchmer, 2004). Thus, these offspring with hearing loss are part of a social world where communication is dominated by sound, to which they have reduced access. It is fair to assume children with hearing loss also have less access to this social world, and therefore to social learning.

Less access to the social world due to hearing loss creates fewer opportunities for social and emotional learning. Hearing children learn a lot just by overhearing and observing their social environment, such as how emotions are labelled (emotion

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1 A cochlear implant is a device that bypasses the damaged part of the ear by converting sounds into electronic pulses, and these electronic pulses stimulate the auditory nerve.

recognition), which behaviours are praised, and which are corrected (moral standards and social rules), and how one person evaluates the other (perspective taking). This so-called incidental learning (i.e., spontaneous learning that lacks the direct intent to learn) occurs less frequently in children with hearing loss as they cannot overhear others' conversations (Rieffe, Netten, Broekhof, & Veiga, 2015).

Not surprisingly, children and adolescents with hearing loss have many social and emotional difficulties, including difficulties in ToM comprehension (e.g., Ketelaar, Rieffe, Wiefferink, & Frijns, 2012). For one, the development of self-conscious emotions is heavily reliant on ToM understanding, so adolescents with hearing loss are at risk for difficulties in the development of self-conscious emotions. The level of self-conscious emotions in children with hearing loss has recently been given more attention in the academic world. One study observed expressions of shame and guilt in young children with hearing loss, after making them believe that they violated a moral rule. Children with hearing loss expressed less shame and less guilt following the eliciting event compared to their hearing peers (Ketelaar, Wiefferink, Frijns, Broekhof, & Rieffe, 2015). Another study showed that children with hearing loss failed to recognize that negative feelings, such as guilt, can be elicited by misbehaviours or immoral actions (Mancini et al., 2016). However, the question remains whether adolescents with hearing loss experience self-conscious emotions to a lesser extent than their typically hearing peers.

SELF-CONSCIOUS EMOTIONS AND AGGRESSION

Self-conscious emotions make it possible for the vast majority of people to avoid indulging in aggressive behaviours. They contribute substantially to a harmonious society, a society in which individuals adhere to social norms and standards set by society (Tangney et al., 2007). Most people will not hit another person, even when the other behaves obnoxiously. Even though hitting might be temping, because it has benefits in the short term (e.g., showing the obnoxious person who is in charge), self-conscious emotions restrain selfish and aggressive impulses. Because one knows that if one feels responsible for harming someone else, one will feel bad about one's previous actions. This negative guilty feeling prevents us from engaging in aggressive behaviour (Tangney et al., 2007). Thus, shame and guilt may be considered the emotional brakes on transgressing behaviours that make a society with "good citizens" possible (Breggin, 2015).

Aggression

"Aggression is behaviour directed toward another individual with the proximate intent to cause harm. In addition, the perpetrator must believe that the behaviour will harm the target and the target is motivated to avoid the behaviour" (p. 274, Bushman & Anderson, 2001).

Aggression can take on different forms, including overt aggression (e.g., physical: hitting, kicking, pushing; verbal: insulting, name-calling) and relational aggression (e.g., malicious gossiping, ignoring). Moreover, many studies have advocated for making a distinction between two different functions of aggression: proactive aggression and reactive aggression. Proactive aggression refers to "cold-blooded" and purposeful behaviour, as it is motivated by the desire to achieve a certain goal, such as social dominance or material gain (Bandura, 1973; Cima, Raine, Meesters, & Popma, 2013). In contrast, reactive aggression refers to "hot-blooded" behaviour, as it is a response to perceived threat or provocation. It is accompanied by emotional arousal, such as anger and frustration (Dodge & Coie, 1987; Dollard, Doob, Miller, Mowrer, & Sears, 1939).

Even though high levels of proactive and reactive aggression typically co-occur, they lead to different behavioural outcomes, and are driven by different social-cognitive and emotional processes. Proactive aggression is uniquely associated with delinquency, psychopathy, and the expectation that aggressive behaviour will have predominantly positive consequences (Arsenio, Gold, & Adams, 2006; Raine et al., 2006; Vitaro, Brendgen, & Tremblay, 2002), while reactive aggression is uniquely associated with negative emotionality and the tendency to attribute hostile intentions to others (Brendgen, Vitaro, Tremblay, & Lavoie, 2001; Nas, Orobio de Castro, & Koops, 2005; Orobio de Castro, Merk, Koops, Veerman, & Bosch, 2005; Orobio de Castro, Veerman, Koops, Bosch, & Monshouwer, 2002).

Bullying is a particular form of aggression that peaks from middle childhood to late adolescence and cannot be classified as either proactive or reactive aggression (Brown, Birch, & Kancherla, 2005; Finkelhor, Turner, Shattuck, & Hamby, 2015). Being a victim of bullying is detrimental to adolescents' well-being: adolescents highly value evaluations made about themselves by their peers and being bullied is a clear sign that others do not accept you as you are. Aggressive behaviour that is executed repeatedly, over time and directed against an individual who is in a weaker position is considered bullying (Olweus, 1997). The power imbalance and repetitive nature indicates that bullying occurs within a longer-lasting (but presumably negative) social relationship, while general aggression can also take place in a one-time encounter with a stranger or repeatedly with a familiar individual of similar power.

Bullying occurs most often in a peer context such as a school environment (U.S. department of education, 2011). Bullying is often motivated by the desire to obtain

social dominance, and by a fear of becoming the victim of bullying oneself (Houghton, Nathan, & Taylor, 2012; Olthof & Goossens, 2008; Olthof, Goossens, Vermande, Aleva, & van der Meulen, 2011).

Shame, guilt and aggression

The link between guilt and aggression is rather consistent and straightforward; more experienced and anticipated guilt is linked to less antisocial behaviours such as delinquency, psychopathy, and bullying. Adolescents with higher levels of guilt display less aggressive behaviours (Furukawa, Tangney, & Higashibara, 2012; Stuewig, Tangney, Heigel, Harty, & McCloskey, 2010; Tangney, 1996), including bullying (Menesini & Camodeca, 2008). In contrast, the link between shame and aggression has yielded conflicting findings. Some researchers have emphasized that shame, like guilt, has an adaptive function and prevents adolescents from behaving aggressively (Harter, 1999; Olthof, 2012). Shame signals that others might evaluate you negatively, while all humans have the intrinsic desire to belong, be approved, and be accepted by our social environment. As such, shame could motivate us to conform and behave according to the social standards. As aggression is condemned by (most) others, anticipated shame could therefore serve as an inhibitor of aggressive behaviour (Harter, 1999; Olthof, 2012). In contrast, some researchers argue that shame is mostly a maladaptive emotion because it composes a severe threat for the self as individuals perceive themselves as flawed. The negative self-evaluation that accompanies shame is undeniably painful and needs immediate amelioration, therefore individuals are observed to act hostile and externalize the blame in order to diminish the feelings of self-blame (Bennett, Sullivan, & Lewis, 2005; Tangney & Dearing, 2002). This so-called shame-rage is evidenced by studies showing that high levels of shame in adolescents are related to higher levels of aggression (Stuewig et al., 2010; Tangney, 1996). However, although cross-sectional studies have examined the link between self-conscious emotions and aggression, the longitudinal contribution of self-conscious emotions to the development of aggression in adolescence is still unknown. **The second main aim of this dissertation is to investigate the contribution of self-conscious emotions to the development of aggression.**

Longitudinal research

So far, our knowledge on the relation between self-conscious emotions and aggression is mainly derived from cross-sectional studies. An important next step is to take development into account. Cross-sectional studies can only conclude that, for example, lower levels of guilt are related to higher levels of aggression. However, no statements can be made whether self-conscious emotions contribute to changes in aggression over

the course of adolescence. Using longitudinal research, it is possible to examine whether adolescents with increasing levels of aggression differ from adolescents with stable or decreasing levels of aggression in their levels of self-conscious emotions. In addition, longitudinal research enables studies on bidirectional relationship between self-conscious emotions and the development of aggression. For example, will adolescents bully more often due to lower levels of guilt? Or, do bullying adolescents become less prone to guilt? Thus, longitudinal research can provide important new insights in the importance of self-conscious emotions for the development of aggression.

OUTLINE OF THE CHAPTERS

This dissertation investigates the longitudinal contribution of self-conscious emotions to the development of aggression during adolescence, in both typically developing adolescents, and two groups of adolescents with less access to the social world: adolescents with ASD and adolescents with hearing loss. The first half (chapters 2 and 3) of this dissertation focusses on adolescents with ASD, and the second half focusses on self-conscious emotions and aggression in adolescents with hearing loss (chapters 4, 5 and 6). Chapters 3, 5 and 6 also include an age-matched control group without restricted access to the social world, to unravel the longitudinal contribution of self-conscious emotions to the development of aggression in typically developing adolescents.

In **Chapter 2,** we test whether an important requirement for the experience of self-conscious emotions is present in children with ASD: ToM. Several tasks were administered to assess three key aspects of ToM comprehension (intentions, desires, and beliefs) in children between two and six years old. In **Chapter 3** we assess to what extent shame and guilt contribute to the development of bullying behaviours in adolescents with and without ASD. **Chapter 4** presents the validation of a self-report questionnaire to measure shame and guilt in adolescents with and without hearing loss. This chapter discusses several challenges in measuring shame and guilt, and in administering self-reports in adolescents with hearing loss. The validated questionnaire is used in chapter 5 and chapter 6 to measure shame and guilt in adolescents with and without hearing loss. In **Chapter 5** we examine to what extent shame and guilt contribute to the development of bullying behaviours in adolescents with and without hearing loss. In **Chapter 6** we examine how shame and guilt contribute to the development of aggression in adolescents with and without hearing loss. We distinguish between reactive and proactive aggression, to study their unique longitudinal contributions. **Chapter 7** summarizes key findings, discusses considerations, and makes suggestions for future research.

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Chapter 2

The Understanding of Intentions, Desires and Beliefs in Young Children with Autism Spectrum Disorder

ABSTRACT

This study provides a comprehensive picture of three core elements (intentions, desires, beliefs) of Theory of Mind (ToM) in young children with Autism Spectrum Disorder (ASD, n = 63, Mage = 55 months) and typically developing children (TD, n = 69, Mage = 54 months). Outcomes showed that ASD and TD children understood intentional actions equally well. Yet, children with ASD lacked the social interest to share intentions. Additionally, children with ASD had more difficulties in understanding others' desires and beliefs compared to their TD peers. It is discussed whether the ToM delay seen in children with ASD is a motivational or conceptual problem.

INTRODUCTION

A well-developed Theory of Mind (ToM), the ability to attribute mental states to people and understand their actions based on these mental states, is essential for adaptive social functioning (Dunn, 1996). Yet, previous research demonstrates that children with autism spectrum disorder (ASD) show impairments in their ToM development, which might contribute to the explanation of one of the core symptoms: impaired social interaction and communication (Tager-Flusberg, 2007).

The ability to ascribe intentions (an action in pursuit of a goal), desires (e.g., hopes, wishes, needs), and beliefs (e.g., thoughts, expectations, convictions) to other people are considered to be key aspects of ToM (Searle, 1983). These aspects are intertwined; they all motivate behavior and need to be attributed in order to understand and predict other people's behavior. The aim of the current study was to simultaneously examine understanding of intentions, desires and beliefs in a group of young children with ASD compared to a sample of typically developing (TD) peers. Previous studies in children with ASD have often focused on single elements of ToM, and thus our understanding of ToM impairments in children with ASD is still quite fragmented. In other words, there is a lack of research in which all these core elements are examined simultaneously in children with ASD.

Furthermore, significant improvements have been made in the early identification of children with ASD. Earlier, children were rarely diagnosed with ASD before the age of five (Howlin & Moore, 1997). Nowadays, this can be done reliably around the age of two (Kleinman et al., 2008). A substantial number of children are diagnosed at age three (i.e., 18%), and the majority around the age of four (Center of Disease Control, 2012). The improvement in early diagnosis is beneficial for research as it provides the opportunity to investigate children with ASD at a younger age and with relatively larger sample sizes in comparison to earlier studies. This enables examining children with ASD in a more essential period of ToM development, because all its core elements start to develop before the child's fifth birthday in TD children (Colonnesi, Rieffe, Koops, & Perucchini, 2008; Peterson, Wellman, & Liu, 2005).

Earlier diagnosis also provides possibilities for studying the early language acquisition in children with ASD and its relation to ToM development. Children with ASD are already found to show lower levels of language competence than TD children around the age of two (Mitchell et al., 2006). The ability to communicate with other people through language is assumed to facilitate ToM development. Children learn about other people's mental states by for example overhearing their parents talk about what they think or want. Vice versa, ToM skills might also facilitate language acquisition. Being able to understand which object the communication partner is attending to is

very helpful in learning the names of objects for example. In TD children as well as in children with ASD, language skills were found to be related to ToM skills (Astington & Jenkins, 1999; Fisher, Happe, & Dunn, 2005; Happé, 1995; Milligan, Astington, & Dack, 2007; Sparrevohn & Howie, 1995), yet most of these studies focused solely on belief tasks as an index of ToM.

This study aims to uniquely contribute to the field of ToM understanding in children with ASD by assessing multiple key elements of ToM simultaneously and examining the relationship between language acquisition and ToM components. As compared to prior research, we will include younger children in a large sample. To ensure diagnostic reliability, we only include children whose diagnoses persisted for three years after participation in the study.

Theory of Mind development

The order of acquisition of mental concepts follows a certain sequence in typically developing children (Peterson et al., 2005; Wellman & Liu, 2004). The understanding of intentions starts to develop first and is therefore usually examined when interested in the earliest roots of ToM development (Camaioni, Perucchini, Bellagamba, & Colonnesi, 2004; Meltzoff, 1995). Subsequently, the capacity to understand desires precedes the capacity to understand beliefs (Wellman & Liu, 2004).

This progressive order has been found to be identical in children with ASD. Only, the latter group seems to be delayed in age of attainment in some stages (Peterson et al., 2005). The following sections will therefore discuss the development of understanding intentions, desires and beliefs separately for children with ASD compared to TD children.

Intention understanding

Intention understanding involves the acknowledgement that physical action depends on the goals and intentions of an actor. Children first start to understand the basics of this intentional action, before they are able to respond to others' intentions to require or share something. This latter ability also requires a motivation to share intentions socially (Tomasello, Carpenter, Call, Behne, & Moll, 2005).

Research in the understanding of intentional action indicates that nine-month-old infants already comprehend that actions are based on intentions. These young infants can distinguish between purposeful and accidental actions. In one study the experimenter played a game in which toys were handed to the child across a table (Behne, Carpenter, Call, & Tomasello, 2005). The nine-month-old infants showed more impatience when the experimenter was unwilling to give them the toy than when s/he was unable to do so. Intentional action understanding also involves making goal

references beyond observed events. Meltzoff (1995) showed that eighteen-month-olds were able to complete an unseen goal after seeing an adult demonstrate an act but failing to achieve this end goal.

Several studies examined the understanding of intentional action in children with ASD and reported inconsistent results depending on the tasks used. One study showed that it was more difficult for adolescents with ASD to acknowledge that an action was accidental compared to TD four-year-olds (Phillips, Baron-Cohen, & Rutter, 1998). However, this finding was not replicated in a study by Russell and Hill (2001). Two other studies used versions of Meltzoff's (1995) experiment and also did not find impairments in intention understanding in children with ASD between the ages of two and five years (Aldridge, Stone, Sweeney, & Bower, 2000; Carpenter, Pennington, & Rogers, 2001).

After developing the understanding that actions are intentional, TD children also start to respond to others' intentions by directing their attention and communication around the age of one (Camaioni et al., 2004). At this age, TD children can locate a specific target following an adult's pointing gesture. This ability for joint attention refers to the process in which two individuals share visual attention for the same external object or event (Tomasello et al., 2005). Literature distinguishes two types of pointing gestures which differ in their underlying motive: imperative and declarative pointing. Imperative comprehension refers to understanding that the other is requesting an object by pointing to it, whilst declarative comprehension refers to understanding that the other is directing attention with the sole motivation to share attention for the same object or event (Bates, Camaioni, & Volterra, 1975; Carpenter et al., 2001).

The acquisition of declarative comprehension contributes to language development. Declarative comprehension establishes shared attention for the same stimulus in, for example, a child and a caregiver. Language used by the caregiver is usually related to the particular event, and thereby fosters word learning (Mundy et al., 2007). Indeed, declarative comprehension early in life has been related to a higher level of language competence in the later development of TD children (Kristen, Sodian, Thoermer, & Perst, 2011).

Studies have found that children with ASD are less inclined than TD children to use pointing gestures themselves (see review by Bruinsma, Koegel, & Koegel, 2004), and also less frequently respond to pointing gestures or the eye gaze of others (e.g., Dawson et al., 2004; Leekam & Ramsden, 2006). Major deficits in responding to bids for joint attention are considered one of the earliest signs of ASD (Murray et al., 2008). This pervasive unresponsiveness is so frequently observed that it is actually included as a diagnostic criterion (DSM 5: APA, 2013). Interestingly, it has been found that children with ASD are impaired with regard to the comprehension of declarative pointing but not in imperative pointing (Baron-Cohen, 1989).

Desire understanding

TD children as young as two years of age can predict someone's behavior based on the desires of that person. For example, in a study by Wellman (1990), two-year-old children were told that a story character enjoys swimming. When children were asked whether this character would go swimming or go to the park, children were able to correctly predict the subsequent act. This indicates that children understand that desires motivate behavior. Yet, this does not necessarily imply that children understand the subjectivity of desires. What if children in the Wellman study hated swimming themselves? Would they still have predicted the story character would go swimming? Subsequent research suggests they would not have succeeded in that case, because children of two years of age let their own desires guide their predictions of the behavior of others. Around the age of four TD children acknowledge the subjective character of desires (Rieffe, Terwogt, Koops, Stegge, & Oomen, 2001).

Previous studies indicate that the understanding of desires in children with ASD is in line with their mental age (Baron-Cohen, 1991). Children with ASD often show an adequate understanding of desires as inner drives which cause behavior (Peterson et al., 2005; Phillips, Baron-Cohen, & Rutter, 1995). However, these studies have not controlled for the child's own preferences and it is therefore unclear whether children with ASD would also attribute desires to others which differed from their own. Therefore, to date, it is still inconclusive whether children with ASD truly appreciate the subjectivity of desires.

Belief understanding

The development of belief understanding begins slightly later than desire understanding, with the notion that beliefs govern actions (Peterson et al., 2005). Subsequently, children also start to acknowledge the subjectivity of beliefs, which is often measured with the traditional false belief task. In this task children are presented with a story in which one character has a belief about a location of an object that does not correspond to the real location. Then, children are asked where this character will look for the object. TD children around the age of four successfully predict that the character will look for the object at the location where s/he thinks the object is, instead of the real location (Wellman, Cross, & Watson, 2001; Wimmer & Perner, 1983).

Difficulties in understanding false beliefs in children with ASD have received a great amount of attention. Baron-Cohen and his colleagues (1985) found that 80 percent of the children with ASD failed the false belief task, even though they had a verbal mental age above five years old. A large number of studies have replicated this finding and have indicated that the majority of children with ASD pass false belief tasks when they have a verbal-mental age of at least eleven years (for a review see Happé, 1995).

Current study

In this study, we aimed to investigate three core elements of ToM in two- to six-year-old children with ASD compared to TD children. For intention understanding, we hypothesized that children with ASD understand intentional actions to the same extent as their TD peers (Aldridge et al., 2000; Carpenter et al., 2001). Additionally, we expected no difference in responses between the two groups with regards a pointing gesture carried out by the experimenter, requesting an object (i.e., imperative comprehension). Yet, we did expect fewer responses from the children with ASD to a pointing gesture, which is solely produced in order to share attention (i.e., declarative comprehension), compared to their TD peers (Baron-Cohen, 1989).

For desire understanding, we expected children with ASD to predict behavior successfully based on desires when these desires corresponded with their own (i.e., similar desires) (Phillips et al., 1995). However, we expected that the children with ASD would find it more difficult to predict the behavior of others, when that desire was in conflict with their own desire (i.e., dissimilar desire). As repeatedly suggested in the literature, we expected children with ASD to be less able to understand false beliefs when compared with TD developing children (Baron-Cohen et al., 1985; Happé, 1995).

We also aimed to explore the relationship between declarative comprehension and language competence. We expected to find a positive relationship in both children with ASD and TD, because both concepts have been related before in TD children. Confirmation of this hypothesis might explain language difficulties often seen in children with ASD (Kristen et al., 2011).

METHOD

Participants and procedure

In total, 150 children between the ages of 2 and 6 years participated in this study. The sample included 78 children with ASD recruited via an institution specialized in diagnosing ASD in children and adolescents: the Center for Autism in Leiden, the Netherlands. Children were recruited in two ways. First, parents of children who had already received a diagnosis within the autistic spectrum were approached. Second, parents of children who were still in the diagnostic process were contacted. Only those children who received a formal diagnosis were included in the sample. A diagnosis within the autistic spectrum (i.e., Autistic Disorder, Asperger's disorder, PDD-NOS) was issued using the DSM-IV-TR criteria by a qualified child psychologist or psychiatrist using parental reports and clinical observation. Three years later, families were contacted to investigate whether children had retained their diagnostic status

over time. In the ASD group 62 children had maintained their diagnosis (79.5%), 14 children moved from the autistic spectrum (17.9%), and the parents of 2 children could not be contacted (2.6%).

The sample also included 72 TD children, recruited from day-care centers and mainstream primary schools. Parents and/or teachers indicated that TD children were free of any clinical problem. The TD children were matched with the children with ASD based on age and gender. Like the ASD group, families were contacted to investigate whether children were still free of clinical problems. In the TD group, 1 child had received an ASD diagnosis in the meantime, and 2 children were excluded because they had developed a non-autistic developmental disorder. This leaves a sample of 63 children with ASD (Mean age = 54 months, SD = 12.7) and 69 TD children (Mean age = 55 months, SD = 14.4).

TD children had been tested by the SON-R (a standard Dutch non-verbal intelligence test), and IQ scores from children with ASD were retrieved from school files or tested at the Centre for Autism. Children with ASD were therefore tested using various IQ tests (i.e., SON-R, WISC III, WPPSI and WNV-NL). Only children with an IQ above 70 were included in the study. IQ scores were missing for 21 TD children and 7 children with ASD. TD children had a higher IQ score compared to children with ASD, $t(102) = 3.25$, $p = .002$, $r = .31$. Table 1 shows descriptive characteristics for both samples.

The Ethics Committee of Leiden University and the Center for Autism granted permission for the study and all parents gave written consent before testing. All children were tested individually in a quiet room at home, school, or at the Center for Autism. Sessions took approximately 30 minutes.

Materials

Indices for language

The *Child Development Inventory* (CDI; Ireton & Glascoe, 1995) assesses the current level of development of 1- 6-year-olds. In this study we used 2 scales of this questionnaire: Expressive Language (50 items) and Language Comprehension (50 items). For each item the parent is presented with a statement and asked to indicate whether this does or does not apply to their child (0 = no, 1 = yes). Both scales showed excellent reliability, with a Cronbach's Alpha of .98 for Expressive Language and .97 for Language Comprehension.

Although the desire and belief tasks were designed to place minimal verbal demand on children, they did involve a short story. To ensure task comprehension, the tasks were only administered to children with sufficient language skills (Ketelaar, Rieffe, Wiefferink, & Frijns, 2012). To establish whether children would be able to understand

Table 1. Characteristics of Participants.

	ASD (*n* = 63)	TD (*n* = 69)
IQ score, mean (SD)*	99.9[b]	110.0[a]
Age, mean (SD), months	54.6 (12.7)	54.5 (14.4)
Age range, months	21-72	21-72
Gender, no. (%)		
Male	55 (87)	60 (87)
Female	8 (13)	9 (13)
ASD subtype, no. (%)		
Autistic Disorder	39 (62)	
PDD-NOS	24 (38)	
Age of diagnosis, no. (%)		
1 year	1 (2)	
2 years	5 (8)	
3 years	11 (18)	
4 years	15 (23)	
5 years	14 (22)	
Unknown	17 (27)	

Note that IQ scores were missing for 7 children with ASD and 21 TD children.
Different letter-superscripts indicate differences on rows at *p* < .05.

the short stories used in the tasks, we assessed whether children could comprehend short sentences and whether they were familiar with the objects used in the stories. First, parents were asked if their children understood a series of simple sentences. These sentences matched the structure of the ones used to formulate stories in the desire and belief tasks. Second, children were shown a page with the 13 objects present in the desire and belief task stories. The experimenter named the objects individually and children were instructed to point to the corresponding object. None of the children, who according to their parents, understood simple sentences made more than two mistakes when pointing to the named objects. These children were deemed to have sufficient language skills (see Table 2 for an overview of children with sufficient and insufficient language skills).

Table 2. Mean Scores on Age, Language Comprehension and Language Expression as a Function of Group by Language-Comprehension Skills.

	Sufficient language comprehension		Insufficient language comprehension	
	ASD *(n = 45)*	TD *(n = 62)*	ASD *(n = 18)*	TD *(n = 7)*
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
Age, months	59.1[a] (8.22)	57.8[a] (10.80)	43.2[b] (14.88)	24.4[c] (2.99)
CDI, LC (0-1)	0.82[b] (0.15)	0.93[a] (0.10)	0.43[c] (0.31)	0.39[c] (0.24)
CDI, EL (0-1)	0.86[b] (0.13)	0.95[a] (0.09)	0.46[c] (0.31)	0.43[c] (0.12)

Note: Different letter-superscripts indicate differences on rows at $p < .05$.
LC: Language Comprehension, EL: Expressive Language.

Indices for intention understanding

The *Intention Understanding task* (Ketelaar et al., 2012; Meltzoff, 1995) examines children's understanding of the intentions of others in performing a specific action. The experimenter acted out 3 separate intentions but failed to achieve the final goal state: dropping a string of beads in a cup, sliding a tube in a slightly wider tube and stacking 2 cups. For each intention, the experimenter made 3 attempts and then handed the material to the child. The children passed this task if they completed the intention and they received 1 point for each produced target act (range 0-3).

In the *Imperative Comprehension task* (Colonnesi et al., 2008; Ketelaar et al., 2012) the experimenter pointed to an object which was beyond the experimenter's but within the children's reach. Then, the experimenter requested the object by holding out her hand and alternating between looking at the child and the object. Children passed this task if they gave the object to the experimenter, put the object on the table near the experimenter, or refused to do so (e.g., saying 'no'). The pointing gesture was alternated with other tasks and repeated until children passed, up to a maximum of 3 attempts. Children could earn 3 points if they produced the target behavior the first time, 2 points if they produced it the second time, and 1 point if they produced it the third time.

In the *Declarative Comprehension task* (Colonnesi et al., 2008; Ketelaar et al., 2012) the experimenter pointed in surprise toward a stimulus which stood just behind the child, but at his/her eye level. Then, the experimenter alternated between looking at the child and the stimulus and waited passively for a subsequent 10 seconds. Children could earn 1 point for each of the following behaviors: looking at the stimulus, looking at the experimenter, and making an attempt to communicate (e.g., pointing or vocalizing) about the object (range 0-3).

Eight children had missing data on one of the intention tasks and were therefore not included in the analyses.

Indices for desire understanding

In the *Desire task* (Ketelaar et al., 2012) the child was presented with 4 vignettes which were each supported by pictures. First, a picture was shown in which 2 food items were depicted (e.g., candy and sandwich). Children were asked which food item they liked best. Second, a boy was introduced into the picture story. In 2 vignettes, the boy had a preference that corresponded to the child's preference; the Similar Condition. In the other 2 vignettes, the preference of the boy conflicted with the child's preference; the Dissimilar Condition. After the vignettes were presented, children were asked: "Which food will the boy choose?" To make sure that children understood the vignette and had memorized the information correctly 2 control questions were asked regarding the boy's preferences (e.g., "Does the boy like [candy/sandwich]?"). To earn 1 point, children were required to answer the test question and control questions correctly. Children were given 0 points if they failed to answer the test question or one or more control questions. Mean scores were calculated for the Similar and Dissimilar task separately.

Indices for belief understanding

The *False Belief task* (Ketelaar et al., 2012) follows the same procedure as the Sally-Ann task described in Baron-Cohen and colleagues (1985). Children were presented with a picture story in which a boy puts a toy in one location and leaves the scene. While he is gone, a girl moves the toy to another location. Then, the boy returns and wants to play with his toy. Children were asked: "Where will the boy look for his toy?" In addition, 2 control questions were asked: "Where is the toy now?" and "Where did the boy put the toy before he went away?" Children could earn 1 point if they answered all questions correctly. Children who failed to answer one of the questions received 0 points. When they did not respond or failed to answer verbally to one of the questions children were treated as missing (9 ASD, 3 TD).

RESULTS

Intention understanding

The mean scores of all ToM tasks (intentions, desires, and beliefs) are shown in Table 3. Children's intention understanding was examined, using a 2 (Group: ASD, TD) x 3 (Task: Intention Understanding, Imperative Comprehension, Declarative Comprehension) mixed analysis of variance, which produced a main effect for Group,

$F(1, 122) = 10.11$, $p = .002$, $\eta_p^2 = .08$, which was qualified by a Group x Task interaction, $F(2, 244) = 3.29$, $p = .039$, $\eta_p^2 = .03$. Mean scores revealed that children with ASD scored lower than the TD children on imperative ($t(122) = 2.86$, $p = .005$, $r = .25$) and declarative comprehension ($t(122) = 3.31$, $p =. 001$, $r = .29$), but not in understanding intentional acts ($t(122) = .08$, $p = .934$, $r = .01$).

Additionally, we also analyzed intention understanding with IQ score as a covariate. Both the main effect for Group, $F(1, 94) = 10.99$, $p = .001$, $\eta_p^2 = .11$, and the Group x Task interaction remained significant, $F(2, 188) = 3.23$, $p = .042$, $\eta_p^2 = .03$.

Exploratory analysis was conducted in order to investigate whether children with ASD were less responsive to imperative bids for joint attention altogether, or just needed more bids before they responded. In this additional analysis, children in the imperative comprehension task received 1 point if they responded to at least one bid for joint attention, irrespective of the number of trials needed, and received 0 points if they failed to respond to all three trials. According to this scoring procedure no differences were found in the performance of ASD and TD children, $t(127) = 1.85$, $p = .067$, $r = .16$.

Language skills
Within our sample, 18 children with ASD and 7 TD children had insufficient language-abilities, according to the criteria described in the materials section. One-way ANOVA's with Bonferonni correction showed that children with ASD and TD children with sufficient language abilities were older than their peers without this required ability, $F(3, 128) = 31.59$, $p < .001$, $\eta^2 = .43$ (see Table 2). Children with ASD with sufficient language abilities did not differ in age from TD children with sufficient language ability.

A somewhat different pattern was observed when language-comprehension was analyzed, as scored by parents, on the CDI questionnaire. A one-way ANOVA revealed that TD children with sufficient language skills were scored higher on language-comprehension than children with ASD with sufficient language skills, and children of both groups without sufficient language skills had the lowest scores, $F(3, 105) = 43.66$, $p < .001$, $\eta^2 = .56$ (see Table 2). The same pattern was observed for language expression scores given by parents on the CDI questionnaire, $F(3, 105) = 47.03$, $p < .001$, $\eta^2 = .57$ (see Table 2).

Desire understanding
Only children with sufficient language skills were included in a 2 (Group: ASD, TD) x 2 (Task: Similar Desire, Dissimilar Desire) mixed analysis of variance. This analysis showed main effects for Group, $F(1, 105) = 14.38$, $p < .001$, $\eta_p^2 = .12$, and Task, $F(1, 105) = 7.79$, $p = .006$, $\eta_p^2 = .07$, which was qualified by a Group x Task interaction, $F(1, 105) = 4.92$, $p = .029$, $\eta_p^2 = .05$. Post hoc t-tests showed that the TD children outperformed children with ASD on the Dissimilar Desire task ($t(105) = 4.09$, $p < .001$,

Table 3. Mean Scores on Intention, Desire and Belief Tasks as a Function of Group by Task.

Instrument (min-max)	ASD Mean (SD)	TD Mean (SD)	Between-group difference (95% CI)
	$n = 56$	$n = 68$	
Intention-Understanding (0-3)	2.30^1 (0.99)	2.31^1 (0.91)	0.01 (-.33, .35)
Imperative Comprehension (0-3)	2.09^1 (1.16)	2.60^1 (0.83)	0.51* (.16, .87)
Declarative Comprehension (0-3)	1.88^2 (1.10)	2.38^1 (0.57)	0.51* (.20, .81)
	$n = 45$	$n = 62$	
Similar Desire (0-1)	0.72^1 (0.39)	0.86^1 (0.31)	0.13 (-.01, .27)
Dissimilar Desire (0-1)	0.51^2 (0.46)	0.83^1 (0.35)	0.32* (.16, .48)
	$n = 36$	$n = 59$	
False Belief (0-1)	0.42 (0.50)	0.66 (0.48)	0.24* (.04, .45)

Note: *$p < .05$ on rows. Different number-superscripts indicate differences on columns at $p < .05$.

$r = .37$) but not on the Similar Desire task ($t(105) = 1.97$, $p = .052$, $r = .19$). In addition, children with ASD had lower scores on the Dissimilar task compared to the Similar task, $t(44) = 2.74$, $p = .009$, $r = .38$. This difference was not seen in the TD group, $t(61) = .54$, $p = .594$, $r = .07$ (see Table 3).

In a mixed analysis of covariance which corrected for IQ, the main effect for Group, $F(1, 90) = 21.87$, $p < .001$, $\eta_p^2 = .20$ and Task $F(1, 90) = 5.16$, $p = .025$, $\eta_p^2 = .05$ remained, but the Group x Task interaction effect was no longer significant, $F(1, 90) = 3.47$, $p = .066$, $\eta_p^2 = .04$. These two main effects illustrated that TD children outperformed children with ASD; and both groups scored higher on the Similar than the Dissimilar Desire task.

Belief understanding
Children with ASD performed less well on the false belief task than TD children, $t(93) = 2.38$, $p = .019$, $r = .24$ (see Table 3). In an analysis of covariance with IQ as covariate, the main effect for Group remained significant, $F(1, 80) = 9.60$, $p = .003$, $\eta_p^2 = .11$.

ToM abilities and language
Table 4 shows correlations of declarative comprehension, desire and belief understanding with IQ for both groups separately. Performance on the Similar and Dissimilar Desire task were both related to IQ in TD children, whereas in the ASD group IQ was only related to the performance on the Dissimilar desire task. No other relationships with IQ were found.

In addition, correlations of declarative comprehension with age, language comprehension and expressive language were computed for both groups separately. Within the ASD group, declarative comprehension was related with age but this was not the case in the TD group. After correcting for age, declarative comprehension was significantly related both to language comprehension and to expressive language in TD children, but not in children with ASD (Table 4).

To assess the relationships between desire and belief understanding with age, expressive language and language comprehension, we computed correlations for both groups separately. Also partial correlations, corrected for age were calculated. Age correlated with all desire and belief tasks for the TD group, but not for the ASD group. Both language skills correlated with all ToM abilities in children with TD, but again not for the ASD group. When corrected for age, only the correlation between language comprehension and the Similar Desire task remained significant in the TD group (see Table 4).

Table 4. Correlation Coefficients (Partial Correlations Corrected for Age) of Declarative Comprehension and ToM Tasks with IQ, Age and Language

	ASD				TD			
	IQ	Age	CDI, LC	CDI, EL	IQ	Age	CDI, LC	CDI, EL
Declarative Comprehension	$n = 52$	$n = 58$	$n = 53$	$n = 53$	$n = 48$	$n = 69$	$n = 51$	$n = 51$
	.00	.34*	.23 (-.04)	.23 (-.03)	-.27	-.01	.23 (.45**)	.22 (.38**)
Similar Desire	$n = 45$	$n = 45$	$n = 43$	$n = 43$	$n = 48$	$n = 62$	$n = 47$	$n = 47$
	.05	.24	.20 (.03)	.27 (.15)	.37**	.55***	.62*** (.35*)	.31* (-.28)
Dissimilar Desire	$n = 45$	$n = 45$	$n = 43$	$n = 43$	$n = 48$	$n = 62$	$n = 47$	$n = 47$
	.34*	-.07	-.02 (.05)	.11 (.24)	.34*	.37**	.45** (.27)	.44** (.25)
False Belief	$n = 36$	$n = 36$	$n = 35$	$n = 35$	$n = 47$	$n = 59$	$n = 44$	$n = 44$
	.25	.29	.16 (-.10)	.32 (.17)	-.26	.37**	.46** (.30)	.37** (.14)

Note. $*p < .05$; $**p < .01$; $***p < .001$ (2-tailed).
CDI: Child Development Inventory, LC: Language Comprehension, EL: Expressive Language.

DISCUSSION

The aim of the present study was to gain a better understanding of three core elements of ToM skills in young children with ASD. Our study confirms previous studies which demonstrated that young children with ASD (mean age 55 months) can understand other people's intentional acts to the same extent as their TD peers, because children in both groups could equally often finish the experimenter's failed acts (Aldridge et al., 2000; Carpenter et al., 2001). Despite this promising outcome, we did observe lower performances in children with ASD when compared to their TD peers when intention understanding involved social sharing, as is the case in both the imperative and declarative pointing comprehension. Additionally, children with ASD and TD children performed equally well when predicting the choices of others based on the protagonist's desires, but when the desires conflicted, children with ASD more often attributed their own desire to the protagonist than did their TD peers. This pattern was also evident when we tested their false belief understanding; children with ASD more often predicted the story character's behavior based on their own belief.

These findings remained mostly unchanged when IQ was taken into account except for children's scores on the desire tasks. When IQ was controlled for, children with ASD scored lower than their TD peers on both desire tasks. Possibly, the desire task also did a stronger appeal on other cognitive functions, such as short term memory or verbal abilities. Nevertheless, both groups still performed better on the similar than the dissimilar desire task as was expected, showing that children of this age acknowledge that desires guide behavior, but not necessarily that different people can have different desires which guide their actions (Rieffe & Terwogt, 2000).

Language

In line with the literature, we found a positive relationship between declarative comprehension and both language comprehension and expression in the TD group (Astington & Jenkins, 1999; Kristen et al., 2011). Unexpectedly and contrary to previous studies (Fisher et al., 2005; Happé, 1995), these concepts were not related in the ASD group. A possible explanation for this contrary finding is that children in our sample were younger than in prior research examining this relationship. Factors other than declarative comprehension might play a more pronounced role in the acquisition of language in children with ASD. A cautious interpretation is recommended, because while it has been indicated that language comprehension and expression can both be measured reliably by parent report, our findings rely on the CDI, which is not a formal test of language abilities (Ireton & Glascoe, 1995). Future studies should unravel which factors are important in the early language learning of children with ASD.

Measuring intentional states

In the present study, children with ASD and TD children were equally capable of finishing the experimenter's failed acts, which lead us to conclude that the ability to derive intentions from behavioral acts was intact in the ASD group. It bears mentioning that other studies have questioned whether performance on this task, as developed by Meltzoff (1995), truly reflects acknowledgement of intentions rather than desires (Williams & Happe, 2010). Indeed, intentions and desires are difficult to disentangle since they both reflect intentional states which are aimed at 'the world to fit the mind', preventing us from ruling out that performance on Meltzoff's task also partly reflect children's desire understanding. However, desires are met when they are fulfilled, whereas intentions are met when carried out (Searle, 1983). Therefore, we wish to argue that the current task, in which the child is expected to finish a previously unknown, yet unfinished action by the experimenter, undoubtedly reflects intention understanding, but not necessarily children's desire understanding.

In addition, is has been argued that intention understanding cannot be measured reliably as fully-fledged understanding of intentions only emerges at a later age (Williams & Happe, 2010). Nevertheless, we think that it is necessary and important to examine the early signs of this development, especially in clinical groups which are known for their impaired development. The earlier we can detect different pathways in development with TD children, the better professionals can tailor their interventions.

Social sharing

Previous research suggests that declarative comprehension is impaired in children with ASD compared to TD children, while imperative comprehension is assumed to be intact (Baron-Cohen, 1989; Camaioni, 1997; Camaioni et al., 2004). To our surprise, children with ASD in our study not only had difficulty in declarative comprehension, but also in imperative comprehension compared to TD children. Imperative comprehension and declarative comprehension are not more complex than the comprehension of intentional action. Yet, these tasks do differ on one important aspect: both imperative and declarative comprehension require the motivation and skills for sharing psychological states with others (Tomasello et al., 2005). This requirement is often not met by children with ASD, who display a lack of interest in social communication (APA, 2013). Based on this knowledge, a lower response to both imperative and declarative pointing gestures might not come as a surprise in children with ASD compared to TD children.

The design of the imperative comprehension task in our study enabled us to examine whether the lower performance of the ASD group on this task represented an inability or a lack of social interest. A lower score on imperative comprehension

indicated that children with ASD needed more trials to understand that the experimenter was requesting a certain object, but this does not necessarily imply that these children are not able to understand the request. Indeed, when we only scored whether children passed or failed, irrespective of the amount of trials, children with ASD do no longer perform lower compared to TD children. These findings might indicate that the lower performance on imperative comprehension of children with ASD could have been a reflection of lower motivation to share intentions than TD children, rather than an inability to comprehend the experimenters' intention.

Our suggestion that lower ToM performance may be a reflection of lower social motivation in children with ASD could also be extended to the desire and false belief tasks. This would be congruent with other studies in which task motivation was manipulated (Begeer, Rieffe, Terwogt, & Stockmann, 2003, 2006). In a study by Begeer and colleagues (2003), two false belief tasks were administered, and children were told they would be rewarded for only one of these tasks with candy. Children with ASD tended only to correct false beliefs when rewarded with the candy, which indicates that they are able do understand false beliefs when they are externally motivated. Therefore, it could be questioned whether the ToM performance of the children with ASD in our sample could also be increased when they are externally motivated. This question is particularly important for early interventions, because it indicates that ToM abilities are present but not automatically activated in children with ASD. The conditions under which task motivation is enhanced and results in increased ToM performance should be explored.

Diagnostic stability

Despite the benefits of early confirmation of ASD in children, early diagnosis also has a major disadvantage for clinical practice, as well as for research: an initial diagnosis before the age of five is not always retained. For example, one prospective study indicated that according to clinical judgment, nineteen percent of the children diagnosed with ASD between 16-35 months moved off the autistic spectrum by the second evaluation in later childhood (Kleinman et al., 2008). These findings could be caused by the difficulty to distinguish children with ASD at this age from children with severe global developmental delay (Lord, 1995). However, the inclusion of these children in research samples might have influenced earlier findings regarding ToM abilities in young children with ASD. In the present study, we partly overcame this problem by only including children with ASD who retained their diagnosis for three years. Yet, not all children with ASD in our sample were formally reassessed consistently after three years by qualified professionals. For future studies, we would suggest adopting this approach in order to better distinguish children with ASD from children with a several global developmental delay.

CONCLUSION

This study may indicate that children with ASD do understand intentional action but lack the social interest to share intentions with others. These findings strongly suggest that children with ASD do not seem to appreciate the subjective character of both desires and beliefs.

Since the motivation to share intentions was not directly measured in our study, we cannot state with certainty that the difference in sharing intentions between the TD and ASD group can be derived to the motivation to share intentions. Future studies are needed in order to examine the role of social motivation in ToM functioning. When lower ToM performance in research does indeed reflect a lack of social interest, as we hypothesized, interventions should be aimed at making perspective taking abilities more rewarding during the essential developmental period. A better understanding is needed regarding the influence of the separate core elements on later social functioning.

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Chapter 3

Bidirectional Relationships between Bullying, Victimization and Emotion Experience in Boys with and without Autism
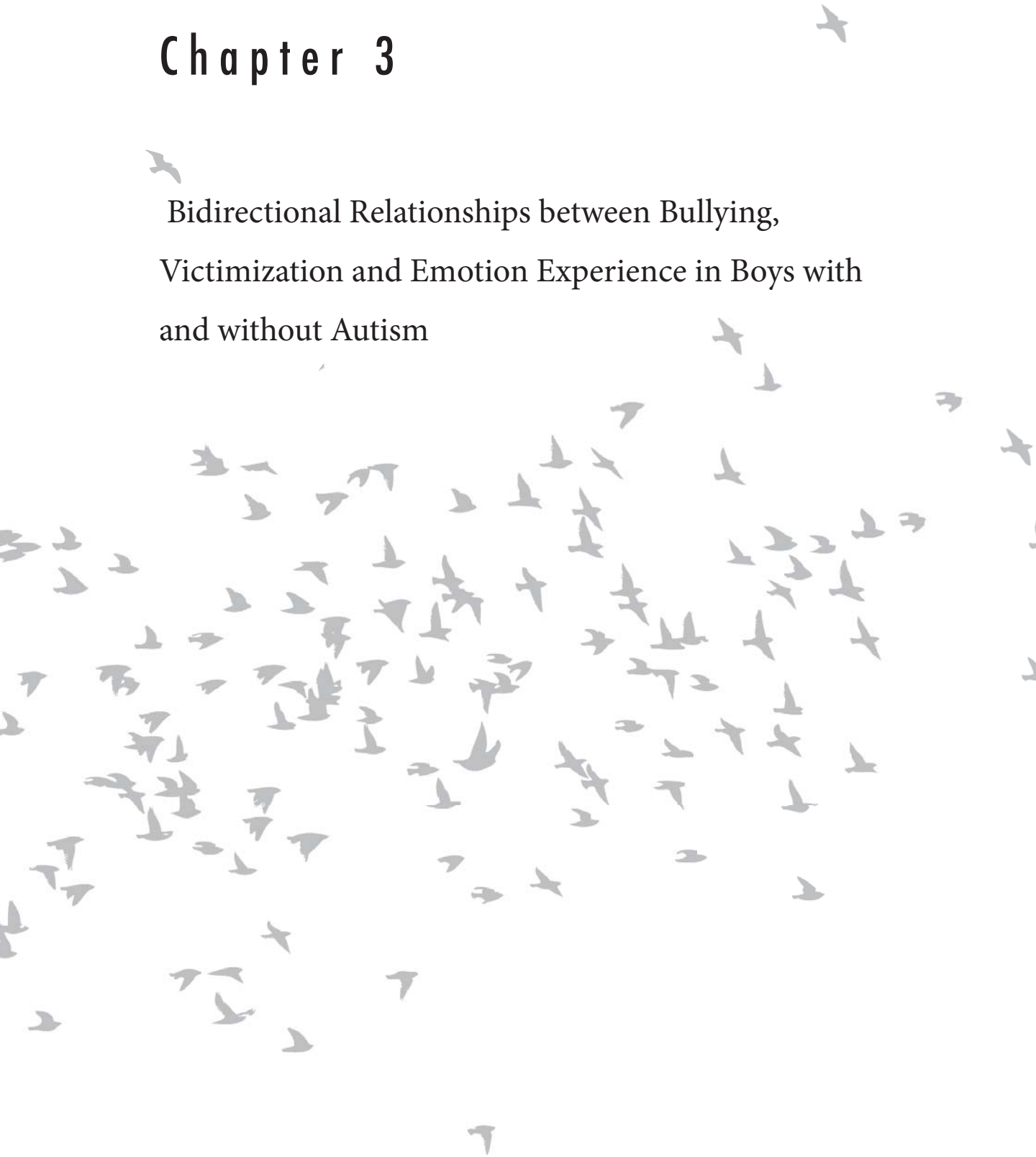
ABSTRACT

Adolescents with autism are more often victims of bullying than peers without autism. Although prior work indicates that emotions play an important role, bidirectional relationships are yet unknown. The present study examines the longitudinal associations of anger, fear, guilt, and shame with being victimized and bullying others in adolescent boys with and without autism. On 3 occasions (9 months in between) 169 boys (43% with autism, 11.6 years at T1) completed self-reports. Findings show that more anger and less guilt predicted bullying behavior, and vice versa, in both groups. In addition, more anger and fear predicted victimization. Fear was a stronger predictor in boys without autism. In turn, victimization predicted more anger, fear, and shame. Especially boys with autism reported more anger after being bullied, suggesting a tenacious vicious circle: these youngsters are likely to be angered when being bullied, which in turn, makes them a target for bullies. Our findings provide new theoretical insights in the role emotions play in the emergence and maintenance of victimization/bullying others in boys with and without autism.

INTRODUCTION

Being involved in bullying processes during childhood, either as the victim or the bully, is a worldwide concern. When bullied, children are repeatedly and intentionally attacked, humiliated, and/or excluded by an individual or group (Sticca & Perren, 2015). Although being bullied and bullying others are common problems during the school-aged years (e.g., Modecki, Minchin, Harbaugh, Guerra, & Runions, 2014), victimization in youngsters with autism is particularly common. While about 10% of the youngsters with autism bully others, almost 50% identify themselves as victims to verbal, physical, or relational bullying, which is three to four times higher than peers without autism (e.g., Maïano, Normand, Salvas, Moullec, & Aim, 2016). The seriousness of emotional, physical, social, and academic problems in victims and bullies in youngsters with autism (e.g., Bitsika & Sharpley, 2014; Fink, Olthof, Goossens, van der Meijden, & Begeer, 2017) signal the importance of understanding the factors underlying victimization and bully behavior in this particular group.

Studies focusing on typical development reveal how emotion experience plays a significant role in the genesis of victimization and bullying others (e.g., Sticca & Perren, 2015), while at the same time youngsters with autism are characterized with emotional difficulties. Youngsters with autism are known for heightened levels of anger and fear and difficulties regulating these emotions (e.g., Hirschler-Guttenberg, Golan, Ostfeld-Etzion, & Feldman, 2014; Jahromi, Meek, & Ober-Reynolds, 2012). These youngsters tend to react strongly (i.e. aggressively and crying) when they are bullied as well as after, at home (e.g., Bitsika & Sharpley, 2014). Moreover, studies on children with autism indicate that the understanding of moral emotions (shame and guilt) is less developed than in children without autism (e.g., Heerey, Keltner, & Capps, 2003) while these emotions contribute to bullying others and victimization. Specifically, feeling guilty contributes to the prevention of bullying as guilt arises after realization of one's norm-transgressing behavior, while shame contributes to more victimization due to appearing vulnerable (e.g., Irwin, Li, Craig, & Hollenstein, 2016; Menesini & Camodeca, 2008).

Although almost everyone experiences anger, fear, and/or shame when provoked, ridiculed, or harassed, we found in an earlier cross-sectional study that the dominant emotion is anger in adolescents with autism, and not fear like in adolescents without autism (Rieffe, Pouw, & Camodeca, 2012). Youngsters with autism might be angered more easily when bullied, because of their poor strategies to handle unpleasant (social) situations and difficulties regulating strong emotions (Jahromi et al., 2012). In turn, angry adolescents may be easy targets for bullies. To our knowledge, the current longitudinal study is the first to examine whether the anger in youngsters with autism is the cause or the effect of victimization.

The present study

The present study is built on our previous cross-sectional study examining the relationships between emotion experiences (i.e. anger, fear, guilt, shame) and self-reported victimization/bullying others in boys with and without autism (Rieffe et al., 2012). The focus of the present study was to examine the bi-directionality of these relationships.

Regarding victimization, we expected anger, fear, and shame to be the strongest predictors given that youngsters with higher emotional reactivity are more vulnerable to victimization (e.g., Spence, De Young, Toon, & Bond, 2009). We expected that especially fear would evoke victimization in boys without autism. In turn, we expected victimization to contribute to increased anger, fear, and shame (e.g., Spence et al., 2009), with anger being a more dominant reaction in adolescents with than without autism.

We also examined relationships with bullying others. Based on the outcomes of the former cross-sectional study, we expected that more anger and less guilt would contribute to more bullying behavior over time in boys with and without autism (Rieffe et al.,2012. In turn, bullying others may increase anger due to the activation of bully-related thoughts, emotions, and responses (e.g., Anderson, 1983) and decrease guilt due to the discomfort of feeling remorse after bullying (Festinger, 1957).

METHOD

Participants and procedure

The autistic sample included boys diagnosed with autism, with an IQ score above 80 (see Supplemental Materials for details), and without additional diagnoses. Diagnoses were admitted by child psychiatrists, based on the Autism Diagnostic Interview-Revised (Lord, Rutter, & Le Couteur, 1994). All boys were recruited from either private facilities or their school that specialized in treating and diagnosing children with autism. The group without autism included 96 typically developing boys, also with an IQ score above 80, and with no diagnosed developmental disorders. They were recruited from mainstream schools. This study was restricted to boys because autism is more common in males and the sample only consisted of a few females. See Supplementary Table S1 for detailed descriptives.

After obtaining parental consent and approval by the Ethics Committee of Leiden University, the boys were visited at school (group with and without autism) or at home or the facilities from where they were recruited (group with autism). At three times points, with approximately 9 months in between, participants were asked to complete questionnaires on a laptop. Participants were ensured that their participation was

voluntary and anonymous. The study was part of a larger study comparing social-developmental development of typically developing children, children with autism, and children with hearing loss.

Materials

The 9-item *Bully Questionnaire* (Rieffe et al.,2012) included an introduction on bullying before asking how often one, over the last two months, executed bullying behavior ("Did you, with the aim of bullying someone…" e.g., hit, push, or kick someone; call someone names) on a 3-point scale: 1= *(Almost) never*, 2 = *Sometimes*, 3 = *Often*.

The *Victim Questionnaire* (Rieffe et al.,2012) included a brief introduction on bullying before asking if one, over the last two months, had been bullied. In this questionnaire the content of the 9 items of the Bully Questionnaire was used, but the items were reformulated to measure victimization (e.g., "Did someone hit, push, or kick you?"; "Did someone call you names?"). One extra item asked how often participants are invited to birthday parties. Items were rated on the same 3-point scale.

The *Mood List* (Rieffe, Meerum Terwogt, & Bosch, 2004) asked how participants have been feeling over the last 4 weeks (e.g., "angry"; "scared") on a 3-point scale: 1= *(Almost) never*, 2 = *Sometimes*, 3 = *Often*. This study included the anger and fear scales (4 items each).

The *Brief Shame and Guilt Questionnaire for Children* (Novin & Rieffe, 2015) consisted of 6 shame-eliciting (e.g., "falling from your bike in front of others") and 6 guilt-eliciting (e.g., "ruining your classmate's painting" hypothetical scenarios. Participants rated how much shame or guilt (6 items each) they would feel if they would experience these scenarios on a 3-point scale 1= *Not at all*, 2 = *A little*, 3 = *A lot*.

Internal consistencies of all scales were good (Supplementary Table S2).

Statistical analyses

To examine the contribution of emotions on Bullying and Victimization and vice versa, General Linear Model (GLM) analyses with clustered bootstrapping were performed. Mean scores examine whether differences between participants in a predictor variable predicted a change in outcome variables. Change scores examine whether a change in the predictor variable predicted a change in outcome variables. To examine the contribution of emotions on Bullying and Victimization and vice versa, we first fitted basic models for each outcome measure. Group (0 = no autism, 1 = autism) was added, as well as Age, IQ, Language, and Victimization as control variables. In addition, interactions with Group were added to each basic model (e.g., Mean Anger x Group and Change Anger x Group). Only significant interactions were retained in the final model. Detailed descriptions of analyses and handling of missing data is described in the Supplemental Materials and illustrated in Supplementary Tables S3 and S4.

RESULTS

Supplementary Table S2 shows mean scores on Bullying Others, Victimization, Anger, Fear, Guilt, and Shame at all time points.

The influence of emotions on bullying and victimization
GLM analyses examined the contribution of emotions to Bullying Others and Victimization. With Bullying Others as dependent variable, the basic model was selected as best fitting model because interactions between Emotions x Group were non-significant. Analyses with Victimization as dependent variable included one significant interaction between Mean Fear x Group.

For Bullying Others, higher levels (mean effect) and increase (change effect) in Victimization contributed to increased Bullying Others. In addition, both Mean and Change Anger and Guilt predicted a change in Bullying Others over time. Anger had an increasing effect, but Guilt a decreasing effect (Table 1).

Victimization decreased with Age (Table 1). Mean and Change Bullying, Anger, and Fear contributed to increased Victimization. A Group x Mean Fear interaction indicated a stronger relation for Fear x Victimization in boys without autism (Figure 1A).

The influence of bullying and victimization on emotions
Four separate GLM analyses examined the contribution of Bullying Others and Victimization to emotions. For the prediction of Fear, Guilt, and Shame, inclusion of interaction terms with Group were non-significant, therefore the basic models were selected. For the prediction of Anger, the interaction of Mean Victimization x Group was significant and included in the final model.

For Anger, Mean and Change Victimization and Bullying Others contributed to increased Anger. A main effect of Group was qualified by an interaction of Mean Victimization x Group, indicating that Mean Victimization was related to increased Anger, but stronger in boys with autism (Figure 1B). For Fear, Mean and Change Victimization predicted increased Fear (Table 2).

For Guilt and Shame, a main Group effect indicated that moral emotions were lower in boys with than without autism. Still, Mean and Change Bullying Others contributed to decreased Guilt in both groups. Shame increased with Age. Mean and Change Victimization contributed to increased Shame (Table 2).

Table 1. Regression coefficients and non-parametric confidence intervals.

	Bullying Coefficients	CI 2.5%-97.5%		Victimization Coefficients	CI 2.5%-97.5%
Intercept	1.275*	[0.870, 1.693]	Intercept	0.397*	[0.057, 0.768]
Age	0.001	[-0.001, 0.003]	Age	- 0.004*	[-0.006, -0.002]
Group	- 0.079	[-0.165, 0.006]	Group	0.553*	[0.271, 0.806]
Language	- 0.005	[-0.023, 0.013]	Language	0.004	[-0.018, 0.010]
IQ	- 0.005	[-0.021, 0.011]	IQ	- 0.003	[-0.015, 0.010]
M Victimization	0.300*	[0.120, 0.470]	M Bullying	0.220*	[0.087, 0.347]
C Victimization	0.236*	[0.070, 0.405]	C Bullying	0.116*	[0.004, 0.217]
M Anger	0.202*	[0.089, 0.321]	M Anger	0.190*	[0.090, 0.291]
C Anger	0.128*	[0.022, 0.232]	C Anger	0.097*	[0.022, 0.173]
M Guilt	- 0.184*	[-0.335, -0.032]	M Fear	0.356*	[0.182, 0.501]
C Guilt	- 0.172*	[-0.270, -0.064]	C Fear	0.160*	[0.037, 0.278]
M Shame	0.016	[-0.127, 0.146]	M Shame	0.063	[-0.025, 0.147]
C Shame	0.008	[-0.105, 0.110]	C Shame	0.085	[-0.006, 0.173]
			M Fear x Group	- 0.326*	[-0.510, -0.119]
			C Fear x Group	0.003	[-0.177, 0.191]

Note. Group: 0 = TD, 1 = ASD; M = Mean score; C = Change score; *p < .05.

DISCUSSION

We longitudinally examined the bidirectional relationships between emotional experience and bullying others/victimization in boys with and without autism. As expected, more anger and less guilt contributed to more bullying behavior 18 months later. Vice versa, more bullying contributed to more anger and less guilt. Also unsurprisingly, adolescents who were victimized, developed more anger, fear, and shame over time. Higher levels of anger and fear, in turn, contributed to victimization, indicating that these stronger levels of negative emotions can be a trigger for bullies who then learn that their bullying is effective. Fear was the most dominant emotion that predicted victimization in boys without autism. Crucially, adolescent boys with autism seem to predominantly experience anger when being bullied, supporting the viewpoint that socially unpleasant situations cause uncontrollable arousal.

Theoretically, our study is the first to test bidirectional relationships between emotion experiences and bullying others/victimization in adolescents with autism. Regarding bullying others, our findings indicate that the developmental pathways are similar for adolescents with and without autism. Quite noteworthy, guilt has a protective

Table 2. Regression coefficients and non-parametric confidence intervals on the prediction of anger, fear, guilt and shame.

	Anger		Fear		Guilt		Shame	
	Coef	CI	Coef	CI	Coef	CI	Coef	CI
		2.5% - 97.5%		2.5% - 97.5%		2.5% - 97.5%		2.5% - 97.5%
Intercept	0.347	[-0.280, 0.903]	0.673*	[0.257, 1.104]	2.585*	[2.196, 2.981]	1.911*	[1.387, 2.424]
Age	0.002	[-0.001, 0.005]	0.001	[-0.001, 0.004]	0.002	[-0.001, 0.004]	0.003*	[0.001, 0.006]
Group	- 0.821*	[-1.332, -0.240]	0.069	[-0.027, 0.166]	- 0.148*	[-0.257, -0.046]	- 0.322*	[-0.439, -0.208]
Language	- 0.002	[-0.024, 0.020]	- 0.013	[-0.032, 0.005]	- 0.005	[-0.027, 0.016]	- 0.006	[-0.030, 0.018]
IQ	0.003	[-0.017, 0.022]	- 0.004	[-0.022, 0.014]	0.002	[-0.018, 0.021]	- 0.004	[-0.023, 0.017]
M Vict	0.380*	[0.132, 0.638]	0.533*	[0.320, 0.751]	X	X	0.331*	[0.063, 0.586]
C Vict	0.391*	[0.099, 0.690]	0.417*	[0.239, 0.588]	X	X	0.301*	[0.056, 0.530]
M Bullying	0.347*	[0.128, 0.572]	X		- 0.230*	[-0.414, -0.056]	- 0.089	[-0.298, 0.117]
C Bullying	0.319*	[0.126, 0.517]	X		- 0.270*	[-0.433, -0.093]	- 0.064	[-0.279, 0.148]
M Vict x Group	0.551*	[0.146, 0.899]						
C Vict x Group	- 0.084	[-0.487, 0.339]						

Note. Group: 0 = TD, 1 = ASD; Coef = Coefficients; Vict = Victimization; M = Mean score; C = change score; An X means that these relationships were not included in the model; *p < .05.
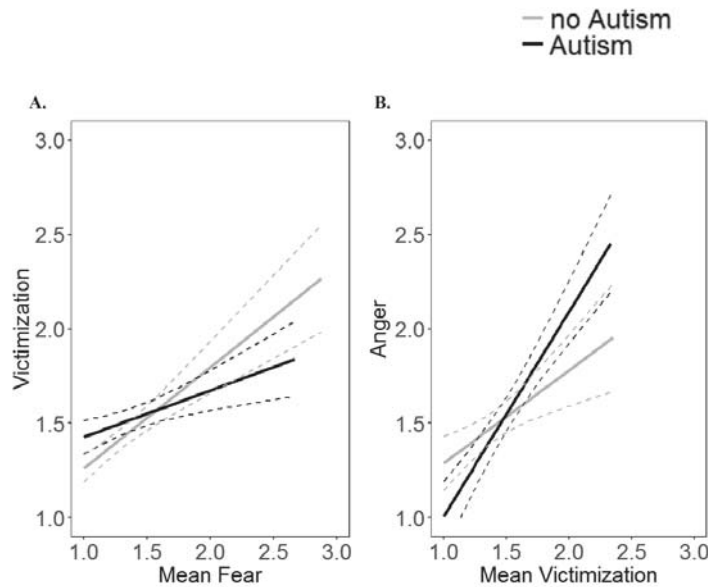
Figure 1. A. Longitudinal graphic representation of the interrelation of fear with victimization. Boys with a higher mean score of fear reported more victimization over time compared to boys with a lower mean score of fear. This relation is stronger in boys without autism. **B.** Longitudinal graphic representation of the interrelation of victimization with anger. Boys with a higher mean score of victimization reported more anger over time compared to boys with a lower mean score of victimization. This relation is stronger in boys with autism. Lines for boys without autism are displayed in grey and lines for boys with autism are presented in black. Dotted lines represent 95% confidence intervals.

role against bullying others in both groups, even though boys with autism overall reported lower levels of guilt than their peers without autism. This is in line with earlier findings showing that also in youngsters with autism social decisions are conform a sense of what is morally right (van Hoorn, van Dijk, Crone, Stockmann, & Rieffe, 2017). In other words, moral emotions motivate to do good and avoid being bad, also in boys with autism.

Pathways to victimization differ somewhat between the groups. Adolescent boys with autism seem to be in a vicious circle; they are likely to react with anger when being bullied, yet (uncontrollable) anger makes them an easier target for bullies. Indeed, in our and prior studies, adolescents with autism report to be more often victims of bullying than their TD peers (e.g., Maïano et al., 2016).

Despite these strengths, limitations should also be noted. First, for practical reasons we focused on boys, not girls. Although it is more difficult to recruit girls with autism, we acknowledge the importance of studying the female autism phenotype, which does not necessarily coincide with that of their male counterparts. We are currently including girls with autism in our studies in order to contribute to this call for more knowledge

by researchers as well as professionals. Second, we recruited adolescents but future research might consider including a younger sample to prevent bullying others and victimization at an earlier stage.

In conclusion, we found that negative basic and moral emotions play an important role in the emergence and maintenance of bullying others/victimization in adolescent boys. Intervention programs aimed at preventing youngsters from bullying others should include empathy training to reduce the moral disengagement that characterizes bullies. Intervention programs aimed at preventing and handling victimization should include a variety of adaptive emotion regulation strategies. Our findings indicate that especially boys with autism would benefit from adaptive anger management training. Compared to their peers without autism, these boys are more vulnerable to fall victim to being bullied, causing higher levels of anger, marking them as future bully targets. Ending this vicious circle is a challenging, but necessary step in future research and intervention.

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Chapter 4

Use of the Brief Shame and Guilt Questionnaire in
Deaf and Hard of Hearing Children and Adolescents

ABSTRACT

No assessment tools are available to measure shame and guilt in children who are deaf or hard of hearing (DHH), while these self-conscious emotions might play a role in the frequently noted social and behavioral problems in this group. Therefore, the aim of this study was to validate the Brief Shame and Guilt Questionnaire (BSGQ) in DHH children. In addition, we examined associations of shame and guilt with social anxiety, self-esteem, delinquency and psychopathic behaviors. Two hundred twenty-five hearing (Mage = 11.62 years) and 108 DHH (Mage = 11.82 years) participants completed the self-report BSGQ. Multigroup confirmatory factor analysis confirmed the two-factor structure (i.e., shame and guilt) of the BSGQ in the DHH group. Measurement invariance was established across both groups. However, the DHH group reported lower levels of self-conscious emotions in comparison to the hearing group. The BSGQ showed good concurrent validity, where shame was associated with higher levels of social anxiety and lower levels of self-esteem, and guilt was associated with lower levels of delinquency and psychopathic behavior in both groups. Future research should investigate the potential behavioral consequences of lower reported levels of self-conscious emotions in DHH youth.

INTRODUCTION

Shame and guilt occur when failing to meet a certain standard, rule, or goal. Yet, shame relates to an unwanted identity, while guilt emerges when causing harm to someone else (Olthof, Ferguson, Bloemers, & Deij, 2004). Consequently, shame is associated with more internalizing problems, such as social anxiety and low self-esteem (Gruenewald, Kemeny, Aziz, & Fahey, 2004; Hedman, Strom, Stunkel, & Mortberg, 2013), while guilt is associated with less externalizing behaviors, such as delinquency and psychopathy (Huesmann, Eron, & Dubow, 2002; Stuewig & McCloskey, 2005).

The development of shame and guilt depends on opportunities for social and emotional learning in the context of the social environment (Rieffe, Netten, Broekhof, & Veiga, 2015). Therefore these emotions may develop less well in children whose access to the social environment is limited by communication challenges, such as hearing loss. Deaf and hard of hearing (DHH) children show more antisocial behaviors than their hearing peers (Coll, Cutler, Thobro, Haas, & Powell, 2009; Theunissen et al., 2014a; Theunissen et al., 2014c), and this may be related to lower levels of guilt in this particular group. Albeit lower levels of shame/guilt are found in a study with DHH toddlers (Ketelaar, Wiefferink, Frijns, Broekhof, & Rieffe, 2015), to the best of our knowledge, no studies have yet examined these emotions and their relations with antisocial behavior and psychopathology in DHH youth. However, there are no questionnaires available to assess self-conscious emotions in DHH youth. Therefore, the central aim of this study is to validate the Brief Shame and Guilt Questionnaire (BSGQ) in DHH children (Novin & Rieffe, 2015).

Shame and guilt
Shame and guilt belong to a special class of emotions, known as self-conscious emotions. Both emotions require self-evaluative processes that occur when failing to meet a certain social standard, rule, or goal (Lewis, 2000; Tracy & Robins, 2004). However, even though shame and guilt are associated, a broad body of literature has emphasized that these emotions are distinct in terms of situational antecedents, appraisals regarding the cause, and subsequent action tendencies (Lewis, 2000; Olthof, Schouten, Kuiper, Stegge, & Jennekens-Schinkel, 2000).

Shame arises in response to an event in which one makes a negative self-evaluation and fears being negatively evaluated by important others (Olthof, 2012; Olthof et al., 2004). In the case of shame, this negative self-evaluation contains a global and stable cause (e.g., "I am an incompetent person"; Tracy & Robins, 2006). Shame elicits feelings of worthlessness and an urge to escape from the evoking social situation, which result in avoidant and withdrawn behaviors (Lindsay-Hartz, 1984; Tangney & Dearing, 2002).

Guilt is experienced when an individual feels responsible for harm caused to another person. In the case of guilt, the accompanying negative self-evaluation focuses on the specific behavior, which is attributed to a specific and unstable cause (e.g., "I did not handle this well"; Tracy & Robins, 2006). Regret over this specific behavior then motivates the individual to attempt to repair the relationship, for example by confessing, apologizing, or restoring the situation (Lindsay-Hartz, 1984; Tangney & Dearing, 2002; Tangney, Wagner, & Gramzow, 1992).

Consequently, shame and guilt are differently related to various psychological and behavioral problems. Higher levels of shame involve degrading and devaluing the self, which promote risk for low self-esteem (Tangney & Dearing, 2002; Tangney, Stuewig, Mashek, & Hastings, 2011). They also involve increased concern about others' negative judgements, which is also characteristic for individuals with social anxiety (Fergus, Valentiner, McGrath, & Jencius, 2010). Yet higher levels of guilt are unrelated to indices of low self-worth and social-withdrawal. Instead, higher levels of guilt are related to lower levels of externalizing, norm-violating behaviors, like delinquency and psychopathic behaviors, and help prevent the individual from harming other people (Rebellon, Manasse, Agnew, Van Gundy, & Cohn, 2016; Stuewig & McCloskey, 2005).

Shame and guilt in children who are deaf or hard of hearing
The distinct contributions of shame and guilt to psychopathology and behavioral problems have been observed in non-DHH children and adolescents (Ferguson, Stegge, Miller, & Olsen, 1999; Stuewig et al., 2015). Yet, to date, the role of self-conscious emotions in the frequently noted social difficulties and problem behavior of DHH children appears to have been overlooked (Theunissen et al., 2014c). DHH children are found to have higher levels of norm-violating behaviors, such as psychopathy and conduct disorder (Coll et al., 2009; Theunissen et al., 2014a; Theunissen et al., 2014c).

The vast majority of DHH children are born to hearing parents, and this poses a challenge to the development of high quality communication (Marschark & Wauters, 2008). DHH children not only have fewer means to engage in conversations with their (mainly hearing) caregivers and peers, but they also miss out on overhearing others' conversations or other kinds of social interactions, resulting in fewer opportunities for social learning. In turn, this provides DHH children with fewer opportunities to acquire a proficient emotional competence, including self-conscious emotions (Rieffe et al., 2015).

Self-conscious emotions arise in light of social standards and expected negative evaluations by others. Yet, social standards are learnt implicitly, through social learning, thus more difficult to pick up from a social environment to which one has less access, as is the case for DHH children. Additionally, DHH children receive less specific

feedback on their own behavior by their caregivers (Rieffe et al., 2015). An extra disadvantage for DHH children is their impaired Theory of Mind (ToM), which is the ability to take others' perspectives in daily situations (Ketelaar, Rieffe, Wiefferink, & Frijns, 2012; Netten et al., 2015), which could hamper the DHH children in anticipating negative evaluations by others. Taken together, these findings suggest that DHH children have fewer means for developing a thorough understanding of self-conscious emotions, as compared to their hearing peers. This supposition is supported by results from one recent observation study involving DHH toddlers, which found lower levels of shame and guilt expression in DHH toddlers than in a hearing control group, in response to shame and guilt inducing events (Ketelaar et al., 2015). But to the best of our knowledge, no other studies have yet investigated experiences of shame and guilt in the DHH population. This could be explained by a lack of assessment tools that are appropriate for measuring shame and guilt in DHH children and adolescents.

Self-reports suitable for DHH children and adolescents
Administration of self-report questionnaires in DHH children requires several special considerations. First, DHH children have a higher incidence of language delays (Marschark & Wauters, 2008), so simple grammar and syntax must be used for each item, to avoid misinterpretation. Second, item content must be uniformly appropriate for hearing and DHH children alike. For example, if an item asks participants to imagine that they failed a foreign language listening test, DHH children would interpret this differently from hearing children because of the impact of their hearing loss. Third, the use of hypothetical situations requires less abstract thinking and less sophisticated linguistic capacities compared to self-reports where participants are asked to rate the applicability of various statements about their general tendency to experience certain feelings, cognitions or behaviors. Therefore, researchers have advocated the use of scenario based self-reports to measure and differentiate shame and guilt in children successfully (e.g., Tangney, 1996). Fourth, although there is no difference in performance between term-based response scales (i.e., I would feel not / a little / very guilty) and correlate-based response scales (i.e., I would want to apologize/my face would turn red; Olthof et al., 2000), DHH children may be less familiar with the correlate-based responses as these often use symbolic language. Therefore, the response scale should be term-based. And fifth, translations in sign language should be made available, since reliabilities for self-report questionnaires have been found to increase when items are presented in a child's native language, or for DHH children in their preferred mode of communication (Cornes, Rohan, Napier, & Rey, 2006).

Both the Test of Self-Conscious Affect for Children (TOSCA-C; Tangney, Wagner, Burggraf, Gramzow, & Fletcher, 1990) and the Self-Conscious Emotions: Maladaptive

and Adaptive Scale (SCEMAS; Stegge & Ferguson, 1994) are widely used self-reports that use a scenario approach. The Brief Shame and Guilt Questionnaire (BSGQ) is a simplified form of the SCEMAS developed to address the needs of children with language impairments, such as children with hearing loss, autism, or language disorders (Novin & Rieffe, 2015). It is also available in Dutch Sign Language. The BSGQ places minimal demands on language capacities, and consists of twelve short descriptions of shame- or guilt- evoking scenarios, using simple grammar and syntax (Novin & Rieffe, 2015; see Table 1 for item content). All items are equally applicable to hearing and DHH children alike. Children are asked to imagine themselves in a described situation and rate the intensity of their anticipated feelings of shame or guilt (term-based response scale).

The BSGQ was previously validated in a hearing sample of Dutch children of 9- to 15-year-old children, confirming the two-factor structure and good reliability (i.e., Cronbach's alphas: shame = .80, guilt = .78). In addition, the BSGQ showed good concurrent validity, with shame being uniquely associated with social anxiety and worry, and guilt being related to lower levels of conduct problems (Novin & Rieffe, 2015).

Given the positive characteristics of the BSGQ, we aimed to validate this self-report questionnaire in DHH children and adolescents from 9 to 15 years old. It is characteristic for this period in life that children prefer to spend the majority of their leisure time with peers (Brown, 2004). A need to belong and to be accepted by peers makes children more susceptible to social evaluation (Blakemore & Mills, 2014; Somerville, 2013; van Hoorn, van Dijk, Meuwese, Rieffe, & Crone, 2016). This motivates young adolescents to evaluate themselves through the eyes of others within social situations, paving the way for more frequent shame experiences (Reimer, 1996). Children this age also gain increasing independence, and are gradually given more freedom. Without constant adult supervision, children become responsible for their own behavioral decisions (Wray-Lake, Crouter, & McHale, 2010). But in order to behave prosocially and make the right choices, children need a moral compass, to overcome the temptation to indulge in self-centered behaviors (e.g., stealing money, blaming others for their own mistakes). Feelings of guilt become increasingly important in this period of life, for the anticipation of guilt can serve as a motivator to behave according to the social standards (Krettenauer & Eichler, 2006; Lake, Lane, & Harris, 1995; Tangney, Stuewig, & Mashek, 2007).

The BSGQ is appropriate for measuring shame and guilt in children between 9 and 15 years old because children are the best informants on their own internal feelings states and they can meaningfully and reliably report them from the age of 8 (Berti, Garattoni, & Venturini, 2000; Ferguson & Stegge, 1995). In addition, children older

than 9 years are able to discriminate shame and guilt accurately (Olthof et al., 2000). To optimize suitability for DHH children, we provided a video translation in sign language for each item.

The present study

The central goal of this study was to examine the extent to which the BSGQ could successfully measure shame and guilt in a sample of DHH children and whether results from DHH children obtained on the BSGQ could be meaningfully compared to those of their hearing peers. In order to achieve this goal, we evaluated construct and concurrent validity. To examine the construct validity, we first assessed the hypothesized two-factor structure (i.e., shame and guilt) across both DHH and hearing children. Second, we assessed the reliability of the shame and guilt scales for each group separately. In the event that measurement invariance was established, we compared levels of shame and guilt between DHH and hearing participants. We predicted that DHH children would report lower levels of shame and guilt compared to their hearing peers, since a previous study indicated DHH children express less shame and guilt (Ketelaar et al., 2015) and DHH children are known to experience greater difficulty appreciating other people's perspectives (Ketelaar et al., 2012; Netten et al., 2015; Rieffe, Dirks, van Vlerken, & Veiga, 2017).

In order to evaluate the concurrent validity of the BSGQ, children completed self-report questionnaires regarding social anxiety, self-esteem, and delinquency. Parents reported on their children's levels of psychopathic behaviors. We predicted that higher levels of shame would be associated with more symptoms of social anxiety (Fergus et al., 2010) and lower self-esteem (Tangney et al., 2011), and we expected that higher levels of guilt would be associated with lower levels of delinquency and psychopathic behaviors (Huesmann et al., 2002; Stuewig & McCloskey, 2005; Tangney, Stuewig, & Martinez, 2014). We expected that these relationships would not differ between DHH and hearing children.

METHOD

Participants

Participants consisted of 225 hearing children (M_{age} = 11.62 years, SD = 1.37, 42.2% boys) and 108 DHH children (M_{age} = 11.82 years, SD = 1.46, 46.3% boys) between 9 and 15 years old. Independent t-tests indicated that the hearing and DHH group did not differ in age ($t(331)$ = -1.22, p = .223), intelligence ($t(298)$ = 1.05, p = .293) and socioeconomic status ($t(249)$ = .73, p = .469). In addition, a chi-square analysis revealed no differences in gender distribution, χ^2 (1, N = 333) = .49, p = .483.

DHH children were recruited through the distribution of leaflets about the study, which indicated a website where parents could go to register if children wanted to participate. Distribution of the leaflets took place at (1) ENT departments of hospitals, (2) speech and hearing centres, (3) special-needs schools providing education to DHH students and, (4) magazines and websites for the target population. All DHH participants were born to hearing parents. Hearing children were recruited from mainstream primary and secondary schools. Inclusion criteria for both groups were (1) no diagnosed developmental disabilities or learning difficulties, such as autism spectrum disorder, ADHD, and/or dyslexia, (2) normal intellectual functioning, and (3) living in the Netherlands or the Dutch speaking part of Belgium. In addition, DHH children were only included if they had an unaided hearing loss of at least 40dB in both ears (i.e., moderate hearing loss) that was detected pre- or perilingually. This criteria of > 40 dB hearing loss is a standard set by the World Health Organization, and indicates an individual has frequent difficulties hearing normal speech, even at close distances. The Ethics committee of Leiden University granted permission for the study and all primary caregivers gave written consent before testing.

Materials

Intelligence and socioeconomic status

Nonverbal intelligence was assessed using two subscales of the Wechsler Intelligence Scale for Children – Third edition (WISC-III; Wechsler, 1991). In the first subtest, Block Design, children were given red and white colored square blocks and asked to arrange them to form geometric designs presented by the test leader in a two-dimensional image. In the second subtest, Picture Arrangement, children were given the task of arranging cartoon pictures from left to right in chronological order. Raw scores for both subtests were converted to norm scores corrected for age. The mean score of these two norm scores was used to examine group differences (see participants).

Socioeconomic status was assessed by requesting that parents indicate maternal and paternal educational level (1 = no/primary education, 2 = lower general secondary education, 3 = higher general secondary education, 4 = college/university) and net household income (1 = < €15,000, 2 = €15,000 - €30,000, 3 = €30,000 - € 45,000, 4 = €45,000 - €60,000, 5 = >€60,000). Net household income was converted to a four-point scale, and a mean score was calculated based on these 3 indicators. The mean score was used to examine group differences on socioeconomic status.

Questionnaires

The Brief Shame and Guilt Questionnaire for Children (BSGQ; Novin & Rieffe, 2015) consists of 12 emotion-eliciting scenarios. Children were instructed to imagine themselves being in a described scenario and asked to rate how ashamed or guilty they

would feel on a three-point scale (1 = not at all, 2 = a little, 3 = a lot). Six scenarios were designed describe behaviors that would cause harm to another and elicit guilt (e.g., "There is only one cookie left in the cookie jar. You quickly put it in your mouth. Now your friend doesn't have a cookie"), and six vignettes were designed to describe incompetent behavior in the presence of others without causing any harm to another and elicit shame (e.g., "You get a very bad grade in school"). The content of the items is presented in Table 1. Mean scores were calculated per scale.

The *Social Anxiety questionnaire* (Theunissen et al., 2012) consists of six descriptions of socially charged situations, such as "talking to someone I don't know" and "entering a room with strangers". Children were asked to report the intensity of their fear for the described situation (1 = no fear, 2 = a little fearful, 3 = a lot of fear). Data of 1 DHH child (< .01%) is missing due to a computer failure in administering this questionnaire. The internal consistency of this questionnaire was rated as good (see Table 2).

To assess children's *global self-esteem,* we used the corresponding scale of the *Children's Self-Confidence and Acceptance Scale* (Rieffe et al., 2007; Theunissen et al., 2014b). Children were asked to consider how well five general statements concerning the self applied to them (e.g., "I like myself"), and to rate each one on a three point scale (1 = not true, 2 = sometimes true, 3 = often true). Data were missing for 5 DHH children (4.6%) due to a computer failure in administering this questionnaire. The internal consistency of this scale was rated as sufficient (see Table 2).

The Delinquency Questionnaire (Baerveldt, Van Rossem, & Vermande, 2003; Theunissen et al., 2014a) is a self-report measure that includes statements about ten minor delinquent offences (e.g., "I stole money from my parents"). Children were asked to report their engagement in these behaviors according to a three-point scale: 1 = never, 2 = once or twice, 3 = three times or more. This questionnaire was rated as showing undesirable to reasonable reliability (see Table 2).

The *Psychopathy Screening Device* (Frick, Obrien, Wootton, & Mcburnett, 1994; Theunissen et al., 2014a) is a parent questionnaire that measures psychopathic behaviors of the child (e.g., the child blames others for his or her mistakes). Parents were asked to rate how much the statements applied to their child (1 = not true, 2 = sometimes true, 3 = certainly true). Parents of 20 DHH children (18.5%) and 50 hearing children (22.2%) did not complete or return the questionnaire. The reliability of the questionnaire was rated as good (see Table 2).

Of the 259 completed Psychopathy Screening Devices 196 were completed by the mother (74.5%), 37 by the father (14.1%), 16 by mother and father together (6.1%), and 1 by an older brother (.4%). For 13 questionnaires the respondent was unknown. A one-way ANOVA, including the 3 main respondent groups (i.e., mother, father, both), indicated no effect for the type of respondent on the psychopathy measure, $F(2,248) = .21$, $p = .935$.

Table 1. Questionnaire items, standardized factor loadings for the Hearing and DHH group separately.

	Hearing $n = 225$	DHH $n = 108$
Factor 1: Guilt		
1. Your classmate is using the red pen the whole time. You also need the pen. You snatch away the pen.	.343	.546
3. You are riding your bike on the pavement. You are going really fast. Suddenly a little girl is standing there and you bump into her.	.694	.819
5. You want to go home quickly. The little girl from next door drops her marbles. You don't help her, because you're in a hurry.	.561	.676
7. Your classmate worked a long time on a painting. But you don't watch out. You knock over a glass of water on his drawing. Everything spills over the painting. The painting is totally ruined.	.942	.925
8. Your classmate hasn't finished her essay on time. She asks you for help. You don't help her, because you don't feel like it.	.672	.703
10. There is only one cookie left in the cookie jar. You quickly put it in your mouth. Now your friend doesn't have a cookie.	.649	.618
Factor 2: Shame		
2. You are walking in the middle of a busy shopping street. You trip. All your books and pens fall out of your bag on the street.	.774	.765
4. You get a very bad grade at school.	.572	.473
6. You are going to school. You have cut your own hair. You feel stupid.	.757	.869
9. You fall from your bike onto the pavement. People stop to watch. You leave quickly.	.770	.712
11. You are standing in front of the class. You have to give a talk. Everyone is looking at you. You forget what you wanted to say.	.673	.886
12. You are at your classmate's house for the first time. You get a glass with chocolate milk. You trip on the carpet. The chocolate milk falls out of your hands.	.763	.821

Note. DHH = Deaf or Hard of Hearing.

Table 2. Psychometric properties of questionnaires on psychological and behavioral problems

	No. of items	N participants		Min-Max	Average inter-item correlation		Cronbach's α	
		H	DHH		H	DHH	H	DHH
Social anxiety	6	225	107	1-3	.45	.36	.83	.77
Self-esteem	5	225	103	1-3	.23	.29	.62	.67
Delinquency	9	225	108	1-3	.21	.14	.70	.62
Psychopathic behaviors	20	175	88	1-3	.16	.16	.77	.79

Note. H = hearing; DHH = Deaf or Hard of Hearing;

Procedure

Self-report questionnaires were administered to children individually in a quiet room at their home or school. Children were seated in front of a computer screen and assured that all answers would be kept confidential and processed anonymously. To ensure the questionnaires would be appropriate for DHH children, only questionnaires were selected that were previously used in this population and in which no complex grammar was used (Theunissen et al., 2012; Theunissen et al., 2014a; Theunissen et al., 2014b). For all participants, questions were presented one by one on the computer screen. Administration of the questionnaire was uniform between groups, except DHH participants also viewed a video clip in which a sign language interpreter provided a translation. DHH participants could repeat these video clips as often as desired. During administration of the questionnaires, a test leader was present for both hearing and DHH children to answer possible questions from participants. DHH children were only tested by test leaders who were proficient in sign language. No questions were asked regarding item content of the BSGQ. All children were given a small present (a comic book) after filling out the questionnaires to thank them for their participation.

Parents were sent (electronic) mail with the Psychopathy Screening Device and questions about their socioeconomic status. Parents were requested to return the questionnaires within 2 weeks after their child's test session.

Statistical analyses

To evaluate the underlying factorial structure, confirmatory factor analyses (CFA) were conducted in R version 3.2.1 using packages lavaan (Rosseel, 2012) and semTools (semTools Contributors, 2015). To take into account the categorical nature of our indicators, robust mean- and variance-adjusted weighted least-squares estimation (WLSMV) was used (Finney & DiStefano, 2013). This estimation technique performs adequately in small samples and little bias occurs in case of multivariate nonnormality (Flora & Curran, 2004).

The hypothesized two-factor model was tested with a CFA for the hearing and DHH group separately (see Figure 1). To test for measurement invariance of the BSGQ across both groups, we performed several multigroup CFA models. First, we examined the hypothesized model simultaneously in both groups without constraints. This so-called *configural model* indicates whether overall model structure is similar across groups (Jöreskog, 1971). Second, we tested for *metric invariance* by constraining factor loadings, so they were the same across groups. Metric invariance assumes that each item is interpreted and responded to in the same way by the respondents. Third, we tested for *scalar invariance* by constraining intercepts equal across groups. Scalar invariance assumes individuals with the same actual level of shame/guilt would report
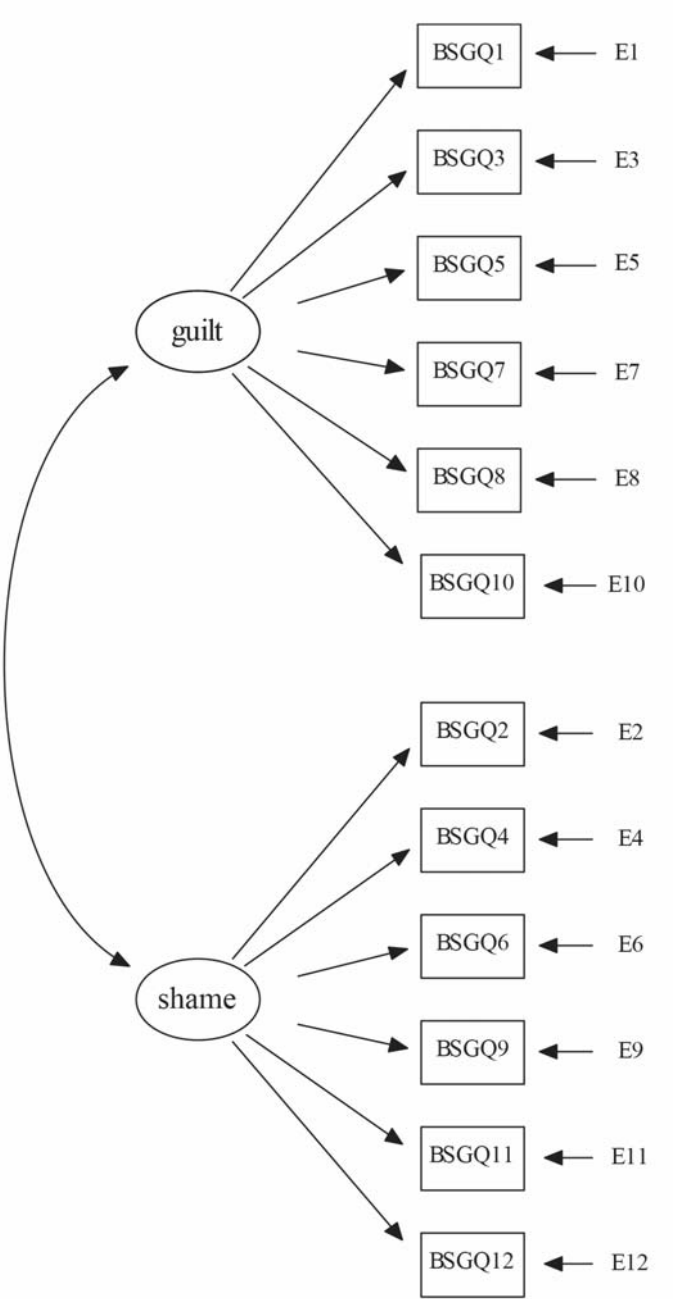
Figure 1. Hypothesized model for the Hearing and DHH group.
Note. BSGQ = Brief Shame and Guilt Questionnaire; E = error variance.

identical on related items in the questionnaire, regardless of their hearing status (Byrne, 2006, 2008; Milfont & Fischer, 2010; Vandenberg & Lance, 2000).

Model fit was assessed using the χ^2/df ratio. Kline (2005) argues that a ratio of less than 3:1 indicates good model fit. In addition, the comparative fit index (CFI), the Tucker-Lewis Index (TLI) and the root-mean-square error of approximation (RMSEA) were reported. CFI and TLI values above .90 indicate acceptable fit and values above .95 represent good fit (Hu & Bentler, 1999). For RMSEA, values below .05 suggest good fit and values up to .08 indicate reasonable model fit (Browne & Cudeck, 1989). Measurement invariance was evaluated comparing the nested models using $\Delta \chi^2$ and ΔCFI with a cutoff point of < 0.005 (Byrne, 2006; Chen, 2007).

Reliability analyses were conducted in IBM SPSS version 23. Internal consistency reliabilities for the BSGQ were examined using Cronbach's alpha. The following ranges for evaluating Cronbach's alpha were used: < .60 is unacceptable; ≥ .60 is undesirable; > 65 is minimally acceptable, > .70 is good; and > .80 is very good (DeVellis, 2003). In addition, average inter-item correlations were calculated. According to Clark and Watson (1995), average inter-item correlations should fall within a .15 to .50 range.

To test whether DHH children differed from hearing children in levels of shame and guilt, Mann-Whitney U tests were conducted. In addition, r was reported as an index for effect size for which an effect size of .10 is considered small, ≥.30 is medium, and ≥ .50 is large (Rosenthal, 1991).

Concurrent validity was evaluated using Spearman rank order correlation coefficients to assess links of shame and guilt with delinquency, psychopathic behaviors, social anxiety, and self-esteem. In addition, we assessed these links using partial correlations in which the other self-conscious emotion was controlled for. To find out whether correlations differed in strength between hearing and DHH participants, Fisher r to z transformations were carried out.

4

RESULTS

Construct validity
The hypothesized two-factor model resulted in adequate to good fit indices in both the hearing group, χ^2/df = 1.97, CFI = .954, TLI = .943, RMSEA = .066, and the DHH group, χ^2/df = 1.45, CFI = .975, TLI = .969, RMSEA = .065. Standardized factor loadings ranged from .343 to .942 (see Table 1). The correlation between shame and guilt was .72 for the hearing group and .77 for the DHH group.

The configural model confirmed that the hypothesized model fits well in both groups, χ^2/df = 1.69, CFI = .965, TLI = .956 and RMSEA = 0.065. Testing metric invariance did not yield a significantly higher χ^2-value compared to the configural model, p = .208. Moreover, the ΔCFI decreased .002 points providing support for full metric invariance (see Table 3). Testing scalar invariance did not result in a substantial increase in the χ^2-value, p = .396. In addition, a ΔCFI-value of less than .001 indicated that constraining intercepts did not lead to a decrease in model fit. Therefore full scalar invariance can be assumed (see Table 3).

Reliability
The psychometric properties of the BSGQ are shown in Table 4. The self-conscious emotion scales showed good reliability with Cronbach's alpha values ranging from .69 to .83. The inter-item correlations were rated as acceptable to good (i.e., range = .28 – .45).

Group differences
The mean scores and standard deviations of the BSGQ are shown in Table 4. Levels of guilt and shame were compared between the hearing and DHH group with two Mann-Whitney U tests. DHH children reported lower levels of shame and guilt, as compared to their hearing peers (U = 10029, z = -2.59, p = .010, r = .14, and, U = 8914.5, z = -3.96, p < .001, r = -.22, respectively).

Concurrent validity
Table 5 shows the outcomes of the correlations of shame and guilt with social anxiety, self-esteem, delinquency, and psychopathic behaviors as dependent variables. Outcomes indicate shame correlated positively with social anxiety (r(332) = .39, p < .001) and negatively with self-esteem (r(328) = -.13, p = .021), including when guilt was controlled for (r(332) = .31, p < .001 and r(328) = -.15, p = .006 respectively). Shame was unrelated to delinquency (r(333) = -.02, p = .789) and psychopathic behaviors (r(263) = -.01, p = .905).

Table 3. Fit Indices for the Multigroup models of the Two-Factor Model of the Brief Shame-Guilt Questionnaire.

	Model fit indices						Indices of Model fit differences			
	χ^2	df	χ^2/df	CFI	TLI	RMSEA	ΔCFI	$\Delta\chi^2$	Δdf	p
Multigroup Models										
Configural model	179.236*	106	1.69	.965	.956	.065	-	-	-	
Metric Invariance	192.526*	116	1.66	.963	.958	.063	.002	13.290	10	.208
Scalar Invariance	203.048*	126	1.61	.963	.961	.061	<001	10.522	10	.396

Note. χ^2 = chi-square; *df* = degrees of freedom; CFI = Comparative Fit Index; TLI = Tucker-Lewis Index; RMSEA = Root-Mean-Square Error of Approximation. *$p < .001$

Table 4. Internal consistency, mean scores and standard deviations of the BSGQ per group.

	No. of items	N		Average inter-item correlation		α		Mean scores (*SD*)	
		H	DHH	H	DHH	H	DHH	H	DHH
BSGQ									
Shame*	6	225	108	.38	.45	.79	.83	2.34 (.49)	2.17 (.55)
Guilt*	6	225	108	.28	.39	.69	.79	2.35 (.41)	2.13 (.49)

Note. α = Cronbach's alpha; H = hearing; DHH = Deaf or Hard of Hearing; BSGQ = Brief Shame and Guilt Questionnaire. An asterisk indicates group differences at $p \leq .01$ as evidenced by a Mann-Whitney U test.

Table 5. Bivariate and partial spearman correlations for Shame and Guilt with Social Anxiety, Self-esteem, Delinquency and Psychopathy collapsed over group.

	Shame				Guilt			
	Bivariate correlations		Partial correlations		Bivariate correlations		Partial correlations	
		95% CI		95% CI		95% CI		95% CI
Social anxiety	.39***	[.29 .48]	.31***	[.21, .40]	.27***	[.16, .36]	.09	[-.02, .19]
Self-esteem	-.13*	[-.23, -.02]	-.15**	[-.26, -.04]	.01	[-.10, .11]	.08	[-.03, .19]
Delinquency	-.02	[-.12, .09]	.09	[-.02, .20]	-.18***	[-.28, -.08]	-.20***	[-.30, -.10]
Psychopathic behaviors	-.01	[-.13, .11]	.08	[-.04, .20]	-.15*	[-.27, -.03]	-.17**	[-.29, -.05]

Note. CI = confidence interval; *$p < .05$, **$p \leq .01$, ***$p \leq .001$. The strengths of the correlations were examined using Fisher r to z transformations and there were no differences found between the hearing and DHH group.

In addition, guilt was positively correlated with higher levels of social anxiety ($r(332) = .27$, $p < .001$), lower levels of delinquency ($r(333) = -.18$, $p = .001$) and psychopathic behaviors ($r(333) = -.15$, $p = .013$). However, guilt was unrelated to self-esteem ($r(328) = .01$, $p = .915$). After controlling for shame, the negative correlation of guilt with delinquency ($r(333) = -.20$, $p < .001$) and psychopathic behaviors ($r(263) = -.17$, $p = .005$) remained. However, guilt was no longer found to be associated with social anxiety ($r(332) = .09$, $p = .104$).

We tested for group differences in the strength of correlations between shame and guilt with social anxiety, self-esteem, delinquency and psychopathic behaviors. Using Fisher r-to-z transformation, a z value score was calculated to assess whether the correlation coefficients differed between hearing and DHH children. The strength of these relationships did not differ between hearing and DHH children. Therefore, only the overall correlations (where both groups were combined) are displayed in Table 5.

DISCUSSION

The aim of the present study was to validate the self-report BSGQ for DHH children. While administration of self-report questionnaires in DHH children contains many challenges due to the impact of hearing loss on language development and communication, we found full support for the two-factor model with shame and guilt as separate constructs in both the DHH and hearing group. Shame and guilt can be successfully measured in DHH children by using the BSGQ, and their scores on the BSGQ can be reliably compared to those of hearing children. Since children were asked to rate the intensity of their anticipated shame and guilt experiences, these results indicated that DHH children were as able as hearing children to distinguish between shame and guilt verbally. In addition, the reliabilities for both the shame and guilt scales for the DHH children were rated as very good or good (i.e., .83 and .79 respectively). These positive results for construct validity and the psychometric properties of the BSGQ in DHH children could be achieved based on simple item content formulation and the availability of video clips with a sign language interpretation. The video clips were frequently accessed by DHH children who indicated sign language as their preferred mode of communication. We recommend this procedure for developing questionnaires for DHH children who prefer sign language, because they can be tested in a standardized manner while minimizing risk that they will misinterpret item content (Enns & Herman, 2011). However, since we did not test the effectivity of the video clips in sign language for the DHH population directly, this could be tested in a follow-up study.

Notably, DHH children reported lower levels of shame and guilt compared to their hearing peers. Self-conscious emotions fulfill a key social function by motivating a broad range of appropriate behaviors (Giner-Sorolla, 2012). Therefore a lower intensity in the experience of these particular emotions may have detrimental effects on children's social and emotional development and functioning. Maintaining relationships could be more challenging for those who experience less guilt. If one does not experience guilt after harming another, one will be less inclined to display reparative behaviors such as apologizing or helping to repair damage (Lindsay-Hartz, 1984; Tangney & Dearing, 2002). Expression of guilt provides the receiver with crucial information as it reflects awareness of the harm done, and intention to avoid repeating that behavior in the future. This makes it easier to forgive the other for the misconduct, and helps reinstate the relationship (Giner-Sorolla, 2012). Lower levels of guilt provide less motivation to display appropriate behaviors (Krettenauer & Eichler, 2006; Lake et al., 1995), and lower levels of guilt found in DHH children may explain the higher incidence of problem behaviors in DHH adolescents (Coll et al., 2009; Theunissen et al., 2014a; Theunissen et al., 2014c). Clearly, more research is needed to understand the implications of lower levels of reported shame and guilt for social-emotional abilities and problem behaviors in DHH children. Validation of the BSGQ in DHH children makes it possible to begin to study these interrelationships in this population now.

Shame is an overwhelming emotion accompanied by a negative evaluation about the global self, causing individuals to feel incompetent and bad about themselves (Lewis, 2000; Tangney et al., 1992). As expected, we found that children with higher levels of shame had lower self-esteem and more social anxiety. Although guilt was also related to more social anxiety, this association disappeared when we controlled for shame, which aligns with other studies (Gilbert, 2000; Hedman et al., 2013). While we stressed that shame and guilt have distinct features, they also share core characteristics. This is illustrated by the positive correlation we found between shame and guilt (i.e., correlation = .55; $p < .001$), which is congruent with other studies (Olthof, 2012; Tangney et al., 1992). Previous studies have emphasized the need to control for the shared variance between shame- and guilt-proneness in assessing its relationship with emotional functioning (Spruit, Schalkwijk, Vugt, & Stams, 2016). Future studies could more closely examine the extent to which covariance in shame and guilt affect predictive value for behavioral measures.

Guilt discourages socially inappropriate behavior, and this claim is supported in this study by associations of higher levels of guilt with lower levels of delinquency and psychopathy. This aligns with previous studies stressing the adaptive function of 'shame-free' guilt (Spruit et al., 2016). In contrast, the relation between shame and

delinquent behavior has been debated in the literature. Some claim that shame is a painful emotion that occurs in the light of a transgression and motivates people to prevent experiencing this emotion in the future, and as such, shame inhibits antisocial behaviors (Tangney & Dearing, 2002; Tangney et al., 2007). Others claim that the pain of shame causes individuals to externalize blame, in order to regain a sense of control over their situation. This has been related to externalizing behaviors, such as aggression and delinquency (Spruit et al., 2016; Stuewig, Tangney, Heigel, Harty, & McCloskey, 2010). In a recent meta-analysis, Spruit and colleagues (2016) found evidence for neither an inciting nor inhibiting role for shame in delinquent behaviors, while guilt was related to less delinquency. This aligns with our findings, as shame was found to be unrelated to both psychopathy and delinquency, whereas guilt was negatively correlated with both norm-violating behaviors.

This study does have several limitations that need to be addressed. First, the internal consistencies of two scales were lower than the expected value of .70 (i.e., for self-esteem in both groups and delinquency in the DHH group). For this validation study it was important to select questionnaires that had been used previously in a DHH population, and could show the unique contribution of self-conscious emotions to social-emotional functioning and problem behaviors. This resulted in limited options, stressing that more validation studies for instruments addressing this particular population are needed. Moreover, existing questionnaires may benefit from additional items. This is especially true for the self-esteem scale, which consisted of only five items. These could be developed in future studies. Nevertheless, we did find the predicted relationships for shame and guilt using these questionnaires. Second, our sample consisted of hearing and DHH with average intelligence and no diagnosed developmental disabilities. Our results can therefore not be generalized to children with intelligence below the normal range or with a diagnosed disability (e.g., Attention Hyperactivity Disorder or Autism Spectrum Disorder). Third, common method variance probably influenced our study results. On the one hand, this could have inflated correlations between the study variables (e.g., self-reports with a three-point scale), while a difference in response format (i.e., how guilty/ashamed do you feel?) could cause a differentiation between shame and guilt based on the measurement method rather than the underlying constructs. However, in this study, the relations of shame and guilt with social anxiety, self-esteem and delinquency were congruent with prior studies. In addition to self-reports, we also assessed psychopathy through parent report, minimizing the likelihood of common method variance. The relations of psychopathy with shame- and guilt proneness were also consistent with prior studies (Tangney et al., 2007). Fourth, there can be a considerable overlap in shame and guilt regarding guilt-evoking situations, which cannot be completely ruled out in our

measure. Future studies could also take this into account by controlling for shame also in the guilt-evoking situations and vice versa. Fifth, the data gathered in this study are all correlational. This makes it impossible to draw conclusions about causal relationships. Sixth, we did not test convergent validity between the BSGQ and other validated measures of shame and guilt.

Future studies could attempt to discover and analyze the longitudinal relationships between self-conscious emotions and the social and behavioral difficulties in DHH adolescents. The BSGQ could be used to track the development of shame and guilt in DHH individuals from late childhood to middle adolescence, a period in which the anticipation of shame and guilt experiences are known to influence behavior choices (Olthof, 2012; Stuewig et al., 2015). In addition, the questionnaire could help determine whether a lower intensity of guilt contributes to a heightened level of proactive aggression or problems in maintaining friendships in DHH children (Gilman, Easterbrooks, & Frey, 2004; Keilmann, Limberger, & Mann, 2007; Theunissen et al., 2014a; Wolters, Knoors, Cillessen, & Verhoeven, 2011). The role of shame in the development of psychopathology is not yet clear. Although shame does seem to contribute to more internalizing symptoms (Gruenewald et al., 2004; Tangney et al., 1992), the protective role in the development of anti-social behaviors cannot be confirmed in this study (Olthof, 2012). Future research could further examine the longitudinal relationships between these variables in order to further unravel the protective or possible harmful effect of shame. Validation of the BSGQ in DHH adolescents paves the way for future studies to begin to unravel the mystery of the role of self-conscious emotion in the social and emotional development of DHH adolescents.

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Chapter 5

Longitudinal Associations between Bullying and Emotions in Deaf and Hard of Hearing Adolescents
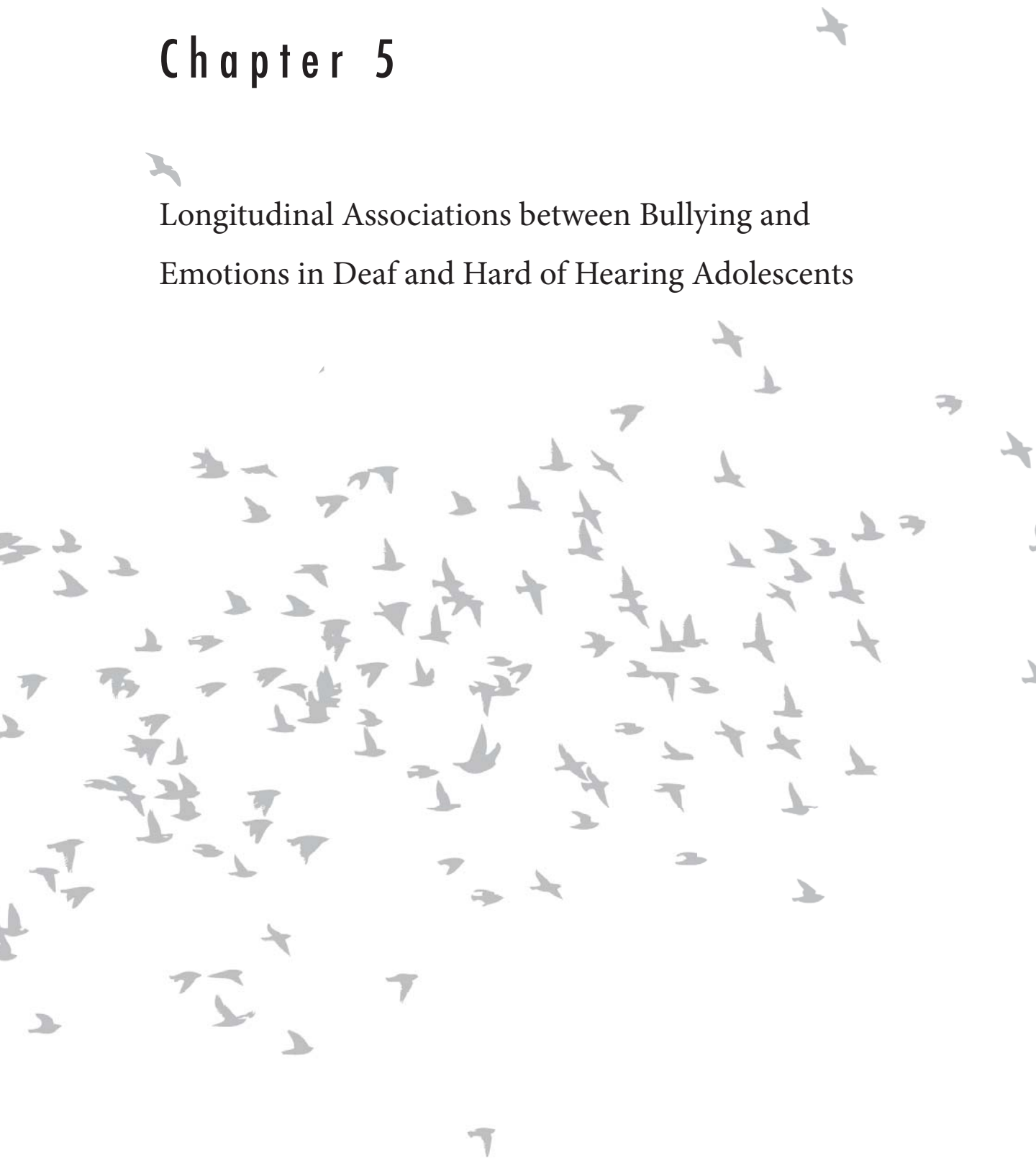
ABSTRACT

In hearing adolescents, emotions play important roles in the development of bullying and victimization. Yet, it is unclear whether this also applies to adolescents who are Deaf or Hard of Hearing (DHH). The present study examines the longitudinal associations of anger, fear, guilt, and shame with bullying/victimization in DHH adolescents. Eighty DHH and 227 hearing adolescents (Mage = 11.7; 103 males) completed self-reports on two occasions with a 9-month interval. Outcomes show that DHH adolescents reported fewer bullying behaviors, but more victimization compared to hearing adolescents. Longitudinal relations between emotions and bullying/victimization did not differ between DHH and hearing adolescents. More anger and less guilt predicted increased bullying, and more bullying predicted increased anger and decreased guilt. Higher levels of anger, fear, and shame predicted increased victimization, and more victimization predicted increased anger, fear, and shame. These findings emphasize that emotions are involved in both the emergence and maintenance of bullying and victimization. These outcomes have clinical implications for the prevention of bullying.

INTRODUCTION

Being excluded from group activities, pushed around, or intimidated by classmates are examples of bullying behaviors that occur frequently within the peer context (Nansel et al., 2004). Bullying is defined as harmful and intentional behavior by which the same individual in a weaker position is targeted repeatedly (Olweus, 1997). Bullying rates range from 10 to 25 percent in school aged youth and are associated with mental health problems in both the victim and the bully (e.g., Nansel et al., 2001; Wolke, Woods, Bloomfield, & Karstadt, 2001). It is therefore important to better understand the underlying emotional mechanisms and consequences of bullying behavior at an age in which bullying is most salient: in early adolescence (Björkqvist, Lagerspetz, & Kaukiainen, 1992).

Some adolescents are at higher risk for social problems such as bullying, and communication impairments especially pose a risk factor. Deaf or Hard of Hearing (DHH) adolescents are noted in the literature for feeling less socially accepted (van Gent, Goedhart, Knoors, Westenberg, & Treffers, 2012; Wolters, Knoors, Cillessen, & Verhoeven, 2011). There are only a few studies on bullying in DHH adolescents, and these confirm more bullying towards DHH adolescents (Pinquart & Pfeiffer, 2015; Sullivan, 2006; Weiner, Day, & Galvan, 2013). DHH adolescents also show impairments in their emotion regulation and communication (Rieffe, 2012; Zand & Pierce, 2011), which are factors known to be related to bullying and victimization in the hearing population (Garner & Hinton, 2010; Rosen, Milich, & Harris, 2012). Therefore, it is important to examine the extent to which emotional functioning is related to bullying in the DHH population. This will provide a better understanding of the emergence and consequences of bullying in this particular population, as compared to hearing peers.

Emotional reactivity and bullying / victimization
Bullying is a form of aggression, and many children and adolescents who bully show higher levels of anger (Camodeca & Goossens, 2005; Rieffe, Camodeca, Pouw, Lange, & Stockmann, 2012). Some adolescents take out their anger on their peers in the form of bullying, regardless of the reason for their anger (Espelage, Bosworth, & Simon, 2001). Yet, adolescents may see bullying as essential for social survival, and intentionally evoke anger. In other words, higher levels of anger could also be the result of bullying. However, no empirical evidence is supporting this hypothesis yet.

Being bullied is a threatening experience, and causes victims to feel unsafe. Consequently, victims feel primarily anxious about being bullied – again – and about what the bullies may say or do the next time (Rieffe et al., 2012). However, many victims

also have higher levels of anger because they consider the bullying to be unfair (Camodeca & Goossens, 2005; Kaynak, Lepore, Kliewer, & Jaggi, 2015; Schwartz, 2000). Some studies have shown that such an overtly reactive response style can be rewarding for the bully, thus encouraging their bullying behaviors (Hanish et al., 2004; Spence, De Young, Toon, & Bond, 2009). This means that adolescents with higher emotional reactivity face higher risk for victimization. In line with these findings, children who seem emotionally unaffected by bullying are victimized less often (Salmivalli, Karhunen, & Lagerspetz, 1996).

Despite associations between emotional expression and emotional reactivity with bullying and victimization, no studies have yet examined these relationships in DHH youth. Young children largely depend on input from their social environment for learning how to control emotions and in which situations it is better to express or conceal an emotion (Knoors & Marschark, 2015). DHH children with hearing parents (i.e., > 90%; Marschark, 1993) are predominantly raised in a spoken language environment, which results in less effective and less frequent communication (Ambrose, Walker, Unflat-Berry, Oleson, & Moeller, 2015; DesJardin et al., 2014). Various studies indeed show that DHH children develop fewer and less efficient strategies for regulating their emotions, and that they show higher levels of emotional expression and emotional reactivity. Wiefferink and colleagues (2012) examined the level of emotion regulation in a group of DHH children with a cochlear implant, ages 1-5 years old. In this study, hearing parents of DHH children indicated that their children expressed negative emotions more often and with greater intensity compared to their hearing peers. Furthermore, parents of DHH children reported more difficulties calming their DHH child. The same children were also less able to divert their attention to avoid frustration with a task, where the experimenter created a situation in which the children were obstructed from achieving a goal.

These difficulties in emotion regulation seem to persist into adolescence. For instance, DHH youth expressed anger more bluntly in a peer conflict situation than members of a hearing group (Rieffe & Terwogt, 2006). DHH adolescents were less able to think of strategies that could help them control their levels of negative emotions in such a situation, and the negative emotions lingered longer than in hearing adolescents (Rieffe, 2012). Combined, these findings suggest that DHH adolescents have more difficulties downregulating their negative emotions, and are more emotionally expressive in their social interactions. To date, it is yet unknown to what extent these elevated levels of emotional reactivity are related to bullying/victimization in the DHH group, nor do we know the extent to which victimization or bullying contributes to more emotional difficulties in this particular group.

Social emotions and bullying / victimization

Besides the basic emotions of anger and fear, social emotions also play an important role in the emergence of bullying and victimization. Social emotions shape behaviour so it fits with the dominant norms and values in a given population (Lewis, 2000; Tracy & Robins, 2004). Guilt usually arises after a morally wrong act that involves harm to another person (Bybee, 1998; Olthof, Schouten, Kuiper, Stegge, & Jennekens-Schinkel, 2000), and the negative feeling of guilt serves to prevent the actor from committing future similar antisocial and harmful actions (Menesini et al., 2003; Olthof, 2012; Thornberg, Pozzoli, Gini, & Jungert, 2015). Cross-sectional studies consistently claim a negative association between guilt and bullying (Mazzone, Camodeca, & Salmivalli, 2016; Menesini et al., 2003; Olthof, 2012), but longitudinal studies that attempt to unravel the direction of this relationship remain scarce. One longitudinal study in adolescents confirms that higher levels of guilt lead to less intentional aggressive behavior, such as bullying. Although it has been argued that bullies need to disengage from and suppress their feelings of guilt in order to justify and approve their actions (Thornberg et al., 2015), longitudinal studies have failed to confirm this (Sticca & Perren, 2015).

In contrast to guilt, shame is not necessarily related to specific harmful acts, but arises when a person feels worthless within the given norms and values of the group (Eisenberg, 2000; Lewis, 2000). This group can be the family or the peer group, and these different social contexts may proscribe different norms and values. In other words, different behaviours may or may not elicit shame, depending on the social context (Olthof et al., 2000). Victims of bullying report higher levels of shame than adolescents who are not being bullied (Menesini & Camodeca, 2008). Longitudinal studies show that shame increases as a consequence of victimization (Duarte, Pinto-Gouveia, & Rodrigues, 2015; Irwin, Li, Craig, & Hollenstein, 2016). Being victimized evidently indicates a lack of acceptance by the peer group, so being a victim may be a humiliating experience. Alternatively, adolescents with shame-proneness may be more vulnerable to victimization, as they appear defenseless. However, this direction of the causal relationship has not yet been tested. Overall, shame could be an important emotion in the perpetuating of victimization, but empirical evidence to support this claim is as yet only partially available.

For DHH youth, it is more challenging to learn about social emotions (i.e., guilt and shame) than it is for their hearing peers. DHH adolescents often lack full access to communication in social situations, and this kind of access is essential for observing and internalizing social rules, including learning how one is evaluated by others in the light of these rules (Knoors & Marschark, 2015). Ample studies indicate that for DHH children, the ability to take someone else's perspective (i.e., Theory of Mind development) is impaired (e.g., Courtin & Melot, 2005; Meristo et al., 2012; Peterson & Slaughter, 2006). Yet a person can only feel guilty for bullying if he or she is aware

of having hurt another person. Similarly, a person can only feel ashamed if he or she fears a negative evaluation by others (Heerey, Keltner, & Capps, 2003).

To the best of our knowledge, only one study examined the actual expression of guilt and shame in a sample of DHH toddlers and preschool children (Ketelaar, Wiefferink, Frijns, Broekhof, & Rieffe, 2015). In this study, feelings of guilt/shame were evoked in three observation tasks. For example, children were led to believe that they failed an easy assignment in one task, and had broken the experimenter's toy car in another task. DHH children in this experimental study displayed fewer guilt/shame related behaviors, as compared with their hearing peers, and a lower level of social emotions in DHH individuals was also confirmed in an older group. DHH adolescents anticipated lower levels of social emotions in eliciting situations, compared to their hearing peers (Broekhof, Kouwenberg, Oosterveld, Frijns, & Rieffe, 2017). However, it is yet unknown if and how social emotions are related to bullying/victimization in this specific group.

The present study
The central aim of this study was to examine the longitudinal associations of emotional experiences with bullying and victimization, in DHH adolescents as compared to their hearing peers. Self-report questionnaires were administered on two occasions with a 9-month interval in between, to two groups: DHH adolescents and hearing adolescents. Two types of emotions were investigated in this study: basic emotions (anger and fear) and social emotions (guilt and shame).

First, we expected more self-reported incidents of victimization in DHH adolescents, as compared to hearing adolescents (Pinquart & Pfeiffer, 2015; Sullivan, 2006; Weiner et al., 2013). However, based on the existing literature, we expected no differences between DHH and hearing adolescents regarding bullying (Bauman & Pero, 2011; Percy-Smith, Caye-Thomasen, Gudman, Jensen, & Thomsen, 2008; Pinquart & Pfeiffer, 2015).

Second, regarding basic emotions, we examined the longitudinal associations of anger and fear with bullying and victimization. We expected more anger to predict higher levels of bullying, and more bullying to predict higher levels of anger (Espelage et al., 2001). We expected both more anger and fear to contribute to the prediction of victimization and more victimization to contribute to more anger and fear (Hanish et al., 2004; Kaynak et al., 2015). These relations were expected to be stronger in DHH adolescents than in the hearing group due to lower levels of emotion regulation already noted in the DHH population (see Figure 1A; Rieffe, 2012; Wiefferink et al., 2012).

Third, regarding social emotions, we expected lower levels of guilt to be associated with more bullying, but we did not expect higher levels of bullying to contribute to

lower levels of guilt over time (Sticca & Perren, 2015). In addition, we expected a bidirectional relation of shame with victimization in both groups (Duarte et al., 2015; Irwin et al., 2016). However, due to the lower levels of social emotions that we expected in the DHH groups, we expected these relations to be less strong in the DHH group, as compared to the hearing group (see Figure 1B; Ketelaar et al., 2015).

To account for individual differences within the groups, we considered factors that could affect adolescents' involvement in bullying/victimization. Therefore, the role of personal characteristics, such as age, gender, parental education level, intelligence, language, type of hearing device, and type of school (mainstream or special) were also taken into account, in the above stated hypotheses.
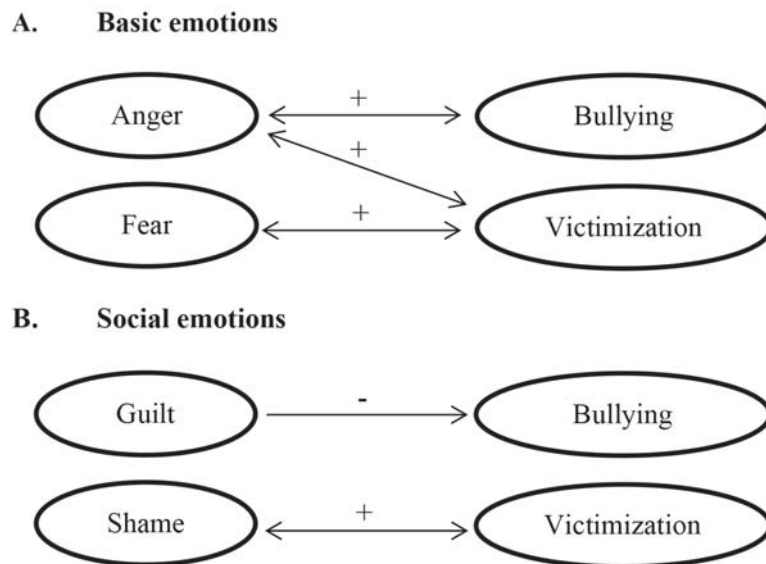
Figure 1. The hypothesized longitudinal relations of (A) basic emotions (i.e., anger and fear) with bullying/victimization and of (B) social emotions (i.e., shame and guilt) with bullying/victimization. The arrows represent either unidirectional or bidirectional relations between variables over time. Positive relations (e.g., an increase of shame will predict an increase in victimization) are indicated by plus signs and negative relations (e.g., an increase in guilt will predict a decrease in bullying) are indicated by minus signs.

METHOD

Participants

The current study was part of a large ongoing research project investigating the social-emotional development of typically developing children and children with less access to the social environment, including DHH adolescents and adolescents with an Autism

Spectrum disorder (e.g., Kouwenberg, Rieffe, Theunissen, & de Rooij, 2012; Rieffe, De Bruine, De Rooij, & Stockmann, 2014; Theunissen et al., 2015). For the purpose of the current study, we used the data of DHH and hearing adolescents for whom self-reports were available at least at one point in time. Part of the cross sectional data (Time 1) on Victimization in DHH adolescents was previously published by Kouwenberg and colleagues (2012).

A total of 307 adolescents between 9 and 15 years old (M = 11.71, SD = 1.45) participated in the present study. Eighty DHH participants were recruited from Otorhinolaryngology departments of hospitals, speech and hearing centers, and special schools for DHH pupils in the Netherlands. In addition, advertisements were placed in magazines and on websites with caregivers of DHH adolescents as the target audience. DHH adolescents were included in the study if they had a hearing loss of > 40 dB in the better ear that was present before language acquisition. More detailed information on the DHH group is presented in Table 1.

The hearing group consisted of 227 adolescents and was recruited via mainstream schools in the Netherlands. Hearing adolescents did not differ from DHH adolescents in Age (Time 1: $t(305)$ = -1.47, p = .142), Gender distribution (χ^2 (N = 307) = .37, p = .539), IQ score ($t(274)$ = 1.13, p = .259), Language ($t(252)$ = .09, p = .932), and Parental education level ($t(231)$ = -.45, p = .656). Information on participant characteristics can be found per group in Table 1.

Materials

Personal Characteristics

IQ was assessed using two nonverbal subtests of the *Wechsler Intelligence Scale for Children – Third edition* (WISC III; Wechsler, 1991). In the block design subtest, participants rearranged red-and-white sided cubes to match a displayed geometrical pattern. In the picture arrangement subtest, participants sequenced cartoon pictures in chronological order. The obtained scores were converted into age-corrected norm scores. The grand population mean was set to 10. The IQ subtests were not administered in 3 DHH and 28 hearing participants due to time constraints. A mean IQ score was calculated based on the two norm scores.

Language ability was assessed using two subtests of the *Clinical Evaluation of Language Fundamentals – Fourth edition* (CELF; Kort, Schittekatte, & Compaan, 2008). In the first subtest on understanding spoken paragraphs, participants were presented with information orally, and asked to answer questions about the content. The second subtest, semantic relations, measured the ability to understand sentences involving comparisons, location, serial order, and time relations. In this subtest, participants listened to a sentence (e.g., 'a man is bigger than...') and selected two correct answers

Table 1. Characteristics of participants.

	DHH	Hearing
No. of participants	80	227
Mean age in years at Time 1 (*SD*)	11.91 (1.62)	11.63 (1.38)
Age range in years at Time 1	9.17-15.75	9.08-14.75
Gender – *n* (%)		
Male	37 (46.3)	96 (42.3)
Female	43 (53.8)	131 (57.7)
IQ score[a]	10.19	10.61
Language[a]	10.29	10.32
Parental education level[b]	3.21	3.17
Type of education - *n* (%)		
Mainstream education	48 (60.0)	227
Special education	32 (40.0)	0
Communication mode - *n* (%)		
Dutch Sign Language /Sign Supported Dutch	28 (35.0)	
Spoken Language only	52 (65.0)	
Type of hearing device - *n* (%)		
Hearing aid	53 (66.3)	
Cochlear implant (CI)	27 (33.3)	
Hearing loss in better ear – *n* (%)		
40-60 dB	20 (25.0)	
61-90 dB	18 (22.5)	
> 90 dB	36 (45.0)	
Unknown	6 (7.5)	

Note. DHH = Deaf and Hard of Hearing. [a] For IQ and Language, age-corrected norm scores are presented. The grand population mean is set to 10. [b] Based on parental education: (1) no/primary education, (2) lower general secondary education, (3) higher general secondary education, (4) college/university.

from four presented alternatives. The obtained scores were converted into age-corrected norm scores (*M* = 10). Due to time constraints, the Language subtests were not administered to 25 DHH and 28 hearing participants. A mean Language score was calculated based on the two norm scores.

Parental education level was determined based on maternal and paternal education. Level: 1 = no/primary education, 2 = lower general secondary education, 3 = higher general secondary education, 4 = college/university. Parents were asked to mark the appropriate option and return it to the examiners by e-mail or post. Data were missing for 74 participants (12 DHH and 62 hearing participants) due to nonresponses. A mean of parental education level score was calculated based on the two indicators.

Table 2. Psychometric properties and mean scores of Bullying roles and Emotions at Time 1 and Time 2 per group.

	No. of items	Cronbach's α		Mean scores (SD)	
		DHH	H	DHH	H
Time 1					
Bullying	9	.68	.77	1.47 (.31)	1.52 (.33)
Victimization	10	.82	.76	1.53 (.39)	1.40 (.31)
Anger	4	.80	.81	1.40 (.39)	1.42 (.45)
Fear	4	.72	.78	1.33 (.40)	1.32 (.42)
Guilt	6	.80	.69	2.09 (.51)	2.35 (.42)
Shame	6	.81	.78	2.17 (.55)	2.34 (.49)
Time 2					
Bullying	9	.80	.79	1.45 (.34)	1.50 (.33)
Victimization	10	.79	.75	1.44 (.33)	1.37 (.29)
Anger	4	.75	.85	1.42 (.39)	1.45 (.47)
Fear	4	.74	.74	1.32 (.40)	1.39 (.43)
Guilt	6	.78	.69	2.16 (.45)	2.39 (.40)
Shame	6	.69	.68	2.31 (.44)	2.44 (.43)

Note. H = hearing; DHH = Deaf and Hard of Hearing. Cronbach's alphas are based on the raw data, since missing scale means were imputed rather than item values.

Self-report questionnaires

The *Bully/Victim Questionnaire* (Rieffe et al., 2012) was used to measure the level of bullying behaviors in adolescents, and the extent to which adolescents were victimized by others. First, adolescents were presented with a definition of bullying stressing that it occurs repeatedly with the intention to hurt someone who cannot defend him or herself. The questionnaire consisted of nine items representing bullying behaviors (e.g., "Did you hit, push, or kick somebody?" or "Did you ignore a person?"). To assess Victimization, adolescents were presented with the same nine items as in the bully questionnaire, but now the formulation of the items was reversed (e.g., "Have you been hit, pushed or kicked"? or "Have you been ignored?"). In addition, one reverse scored item was added: "Are you invited to birthday parties?". Adolescents were asked to indicate their response on a 3-point scale (1 = [almost] never, 2 = sometimes, 3 = often). A mean score was calculated and internal reliabilities for this questionnaire were good (see Table 2).

We performed multigroup confirmatory factor analyses to examine measurement invariance across DHH and hearing adolescents on the Bully Questionnaire and Victim Questionnaire separately. We established configural, metric, and scalar invariance for

both questionnaires. This means that we can reliably compare DHH and hearing children. Detailed information on these analyses are available upon request from the first author.

The Brief Shame and Guilt Questionnaire (Novin & Rieffe, 2015*)* measures guilt and shame proneness in adolescents. The questionnaire consists of twelve short vignettes: six of them were designed to primarily measure Guilt (e.g., "There is one cookie left in the cookie jar. You quickly put it in your mouth. Now your friend does not have a cookie") and the other six to measure Shame (e.g., "You get a very bad grade in school"). Adolescents were asked to imagine themselves in the given situation and indicate how guilty or ashamed they would feel on a three-point-scale (1 = not at all, 2 = a little, 3 = a lot). Mean scores were calculated per scale and internal reliabilities ranged from acceptable to good (see Table 2).

The *Mood List* (Rieffe, Terwogt, & Bosch, 2004) consists of four mood scales: anger, sadness, fear, and happiness. The anger and fear scales were selected for the purpose of this study. Each scale consists of 4 emotion words (e.g., furious, mad; afraid, scared). Adolescents were asked to rate how often they felt this emotion over the last 4 weeks on a three-point scale (1 = [almost] never, 2 = sometimes, 3 = often). Mean scores were calculated per scale and internal reliabilities were good (see Table 2).

Procedure

The self-report questionnaires were completed by participants on two measurement occasions, Time 1 and Time 2, with 9 months in between. The adolescents were tested individually in a quiet room at home or at school. All questions were presented with a laptop one by one. For members of the DHH group, all written questions were accompanied by an optional video, which provided a translation in sign language. Tests for IQ and Language ability were administered at Time 2. Parents were sent a background questionnaire by mail in order to determine parental education level. With parents' consent, details about the amount of hearing loss and use of cochlear implants or hearing aid were obtained from medical records. Written parental consent was obtained for all participants. The study was approved by the Ethics Committee of Leiden University.

Statistical analyses

Data were inspected for missing values, since these could substantially bias results (Graham, 2009). At Time 1, 27 participants had missing values on Bullying due to a computer failure to administer the corresponding questionnaire. At Time 2, 31 participants dropped out (10.1%). The dropouts did not differ from the remaining participants in Age, Gender, and Parental education level. The remaining missing values

were nonresponses. See Table 1 in the Supplementary Appendix for an overview of the missing data.

The pattern of missing data was examined using Little MCar test (Little, 1988), which indicated that data were not missing completely at random ($p < .001$). There is no indication that the values are missing non at random, since the reason for a large portion of the missing values is known and not due to the outcome measures. For example, the missing values on the Bullying questionnaire in the DHH population are caused by a computer error and the main reason mentioned for dropouts from Time 1 to Time 2 were time constraints. Therefore, we assumed that the missing data were missing at random. This type of missing data assumes that missing values are related to other factors that are measured within the dataset that can help to reconstruct actual values, and is best handled using multiple imputation (van Buuren, 2012). This technique aims to create good estimates of the missing data by entering them multiple times. In this study we made 10 imputation sets to fill in the missing mean scores. The imputations were based on all predictor and outcome variables in this study: Bullying, Victimization, Guilt, Shame, Anger, Fear and personal characteristics (i.e., Age at Time 1 and Time 2, Gender, Group, IQ, Language, and Parental education level). All missing values reported in Table 1 of the Supplementary Appendix were imputed. All subsequent analyses were conducted on the imputed data and pooled results were reported.

First, two hierarchical regression analyses were performed to examine whether personal characteristics (i.e., Age, Gender, Parental education level, IQ, Language) were associated with Bullying/Victimization. Personal characteristics that were associated with Bullying/Victimization were subsequently entered in the longitudinal analyses to correct for their effect. For both Bullying and Victimization, an average of the score of Time 1 and Time 2 was calculated and inserted as a dependent variable. In the first model, Group (Hearing = 0; DHH = 1), age at Time 1, Gender (boy = 0; girl = 1), IQ, Language, and Parental education level were included in the model. In the second model, the interactions with Group were added. All independent variables were centered.

Second, to assess the predictive value of social emotions and basic emotions on Bullying and Victimization, generalized linear models (GLM) were performed in combination with the clustered bootstrap procedure. Given the longitudinal character of the data, the assumption of independence (required for regression analyses) is violated. The clustered bootstrap procedure accounts for this dependency through resampling, by drawing from all observations of a single person, rather than drawing from single observations (de Rooij, 2013). The GLM with clustered bootstrapping is comparable to a simple linear regression model and makes few distributional assumptions, such as normality of residuals or homoscedasticity. The number of used bootstrap samples was 10,000.

To study the influence of both between- and within-person effects we decomposed Anger, Fear, Guilt, Shame, Bullying, and Victimization into a Mean score (M; between persons) and a Change score (C; within persons). The Mean score is represented by the overall mean score of the two measurement occasions per individual. The individual Change score is the deviation around this Mean score (i.e., Mean score based on Time 1 and 2, minus the individual score at either Time 1 or Time 2). In addition, we controlled for three personal characteristics in the GLM analyses; Age in months (centered around the youngest participant: 109 months) and a dummy for Group (0 = hearing, 1= DHH), Gender (0= boy, 1 = girl) and Language.

To assess the predictive value of emotions on Bullying and Victimization, we fitted the following basic models:

Bullying = Age + Group + Gender + Language + Victimization (M & C) + Anger (M & C) + Guilt (M & C)

Victimization = Age + Group + Gender + Language + Bullying (M & C) + Anger (M & C) + Fear (M & C) + Shame (M & C)

To examine the unique contributions of emotions on Bullying, we corrected for Victimization in the basic model. Likewise, to examine the unique contribution of Victimization, we corrected for Bullying. In both models, emotions were included only if they were hypothesized to be associated with Bullying or Victimization (see Figure 1).

Following the basic models, we added interaction terms of the Mean and Change score of each emotion with Group (i.e., Group * Mean Anger and Group * Change Anger) to the previous model, one-by-one. Interaction terms were added to the final model, when the interaction with either the Mean or the Change score was found to be significant. To determine whether a variable contributes significantly to the model, we requested the non-parametric confidence intervals. When zero is not included in the interval, the effect is significant. Note that the GLM with clustered bootstrapping does not give model fit indices.

The same procedure was adopted to assess the predictive value of Bullying and Victimization on Anger, Fear, Guilt, and Shame. The basic models for each emotion were:

Anger = Age + Group + Gender + Language + Bullying (M&C) + Victimization (M & C).

Fear /Shame= Age + Group + Gender + Language + Victimization (M & C).

Guilt = Age + Group + Gender + Language + Bullying (M&C).

Subsequently, interactions terms of the Mean and Change score of Bullying roles were added to the final model (i.e., Group * Mean Bullying and Group * Change Bullying and/or Group * Mean Victimization and Group * Change Victimization). The added interactions were only retained when either the interaction with the Mean or Change effect was significant.

Additionally, several ANOVAs were conducted to compare four groups (i.e., 1. Hearing aid, mainstream education; 2. Hearing aid, special education, 3. Cochlear Implant, mainstream education, and 4. Cochlear Implant, special education) to examine differences in Bullying and Victimization (i.e., Mean score of Time 1 and Time 2). Initially, these comparisons were also performed for amount of hearing loss (mild vs. moderate vs. severe) and communication mode (Dutch Sign Language/Sign Supported Dutch vs. Spoken Language). However, the amount of hearing loss strongly overlaps with the Type of hearing device, and Type of education strongly overlaps with the communication mode (See Table 2 in the Supplementary Appendix). Data on these two subgroups were therefore removed for reasons of clarity. However, Table 3 in the Supplementary Appendix displays detailed participant information on DHH subgroups based on amount of hearing loss and communication mode. Comparisons for these subgroups on Bullying and Victimization can be seen in Table 3 of the Supplementary Appendix. Additionally, GLMs were not performed separately for each DHH subgroup, due to small sample size.

Missing value analysis, multiple imputation, independent t-tests and regression analyses were performed in SPSS version 24.0. For GLM analyses R version 3.3.0 was used in combination with the *Clusbootglm* function (de Rooij, 2013).

Table 3. Regression Analyses for Personal characteristics on Bullying/Victimization (average T1 and T2).

	Bullying			Victimization		
	R^2	B	p	R^2	B	p
Step 1	*.16**			*.11**		
Group		-.07	.067		.10	.010
Gender		-.16	<.001		-.04	.262
Age		.03	.004		-.04	.002
IQ		-.01	.244		-.01	.215
Language		-.02	.064		-.02	.013
Parental education level		-.03	.233		.01	.989
Step 2	$\Delta R^2 < .01, p = .561$			$\Delta R^2 = .02, p = .302$		

Note. In step 2, four interaction were added; Group x Age, Group x IQ, Group x Language, and Group x Parental education level. Group (Hearing = 0; DHH = 1); Gender (boy = 0; girl = 1). *$p < .001$

RESULTS

Descriptives
The mean scores for Bullying, Victimization, Anger, Fear, Guilt, and Shame per group are shown in Table 2.

Personal characteristics related to bullying and victimization
Table 3 presents the hierarchical regression analyses with Bullying and Victimization as dependent variables. In the regression analysis with Bullying (i.e., Mean score of T1 and T2) as dependent variable, Gender (0 = boy, 1 = girl) was found to be a predictor, indicating that boys displayed more bullying behaviors than girls (B = -.16, p < .001). Bullying was found to increase with Age (B = .03, p = .004). Group, IQ, Language, and Parental education level were not related to Bullying. Adding group interactions in Step 2 did not result in an increase in explained variance (R^2 < .01, p = .561).

In the hierarchical regression analysis with Victimization (i.e., Mean score of T1 and T2) as dependent variable, DHH adolescents were victimized more often (B = .10, p = .010; Group: Hearing = 0, DHH = 1). In addition, Age (B = -.04, p = .002) and Language (B = -.02, p = .013) contributed negatively to Victimization. Gender, IQ, and Parental education level were not associated with Victimization. Adding group interactions in Step 2 did not result in an increase in explained variance (R^2 = .02, p = .302).

Since Age, Language, and Gender were related to either Bullying or Victimization, these variables were also included in the subsequent longitudinal analyses.

The influence of emotions on bullying and victimization
Table 4 shows the regression coefficients of the performed GLM analyses concerning the predictive effect of emotions on Bullying and Victimization. For both Bullying and Victimization, the basic models were selected as the best fitting model, because no additional group interaction terms were significant.

Bullying increased with Age (b = .004, 95% CI = .002, .005) and the hearing adolescents were more likely to bully compared to their DHH peers (b = -.140, 95% CI = -.204, -.072). In addition, boys were more likely to bully compared to girls (b = -.101, 95% CI = -.154, -.047). Both the Mean and the Change score of Victimization had an increasing effect on Bullying (b = .368, 95% CI = .264, .482, and b = .161, 95% CI = .014, .314 respectively). This indicates that individuals with high scores on Bullying showed an increase in Victimization (Mean effects). The Change score indicates that individuals whose Bullying behaviors increased over time also showed an increase in Victimization. For Anger, both the Mean and Change score of Anger had an increasing effect on Bullying (b = .094, 95% CI = .021, .166 and b = .123, 95% CI = .027, .218

Table 4. Regression coefficients and non-parametric confidence intervals.

	Bullying Coefficients	CI [2.5% - 97.5%]		Victimization Coefficients	CI [2.5%-97.5%]
Intercept	1.388*	[1.085, 1.684]	Intercept	0.456*	[0.213, 0.693]
Age	0.004*	[0.002, 0.005]	Age	- 0.004*	[-0.006, -0.003]
Group	- 0.140*	[-0.204, -0.072]	Group	0.140*	[0.075, 0.210]
Gender	- 0.101*	[-0.154, -0.047]	Gender	- 0.030	[-0.084, 0.026]
Language	- 0.008	[-0.021, 0.004]	Language	- 0.012*	[-0.022, -0.002]
M Victimization	0.368*	[0.264, 0.482]	M Bullying	0.322*	[0.221, 0.424]
C Victimization	0.161*	[0.014, 0.314]	C Bullying	0.088	[-0.039, 0.212]
M Anger	0.094*	[0.021, 0.166]	M Anger	0.083*	[0.005, 0.164]
C Anger	0.123*	[0.027, 0.218]	C Anger	0.010	[-0.085, 0.100]
M Guilt	- 0.161*	[-0.236, -0.088]	M Fear	0.205*	[0.111, 0.295]
C Guilt	- 0.040	[-0.147, 0.070]	C Fear	0.126*	[0.025, 0.227]
			M Shame	0.080*	[0.019, 0.140]
			C Shame	0.044	[-0.032, 0.116]

Note. Group (Hearing = 0; DHH = 1); Gender (boy = 0; girl = 1); *p < .05; M = Mean score; C = Change score.

respectively). In addition, the Mean score of Guilt had a decreasing effect on Bullying (b = -.161, 95% CI = -.236, -.088).

Victimization decreased with Age (b = -.004, 95% CI = -.006, -.003), and individuals with lower scores on Language were Victimized more often (b = -.012, 95% CI = -.022, -.002). A significant effect for Group was found (b = .140, 95% CI = .075, .210). DHH adolescents were more likely to be Victimized than their hearing peers. The Mean score of Bullying had an increasing effect on Victimization (b = .322, 95% CI = .221, .424). The Mean scores of Anger, Fear, and Shame were related to a higher score on Victimization (b = .083, 95% CI = .005, .164, b = .205, 95% CI = .111, .295, and b = .080, 95% CI = .019, .116 respectively). In addition, an increase in Fear predicted an increase in Victimization (b = .126, 95% CI = .025, .227). This indicates that individuals who became more fearful over time reported an increase in Victimization.

The influence of bullying and victimization on emotions
Table 5 shows the regression coefficients of the performed GLM analyses concerning the predictive effect of Bullying and Victimization on emotions. For the prediction of Anger, Fear, Guilt, and Shame the inclusion of interaction terms with Group were non-significant, therefore the basic models were selected.

Table 5. Regression coefficients and non-parametric confidence intervals.

	Anger Coeff	CI 2.5% - 97.5%	Fear Coeff	CI 2.5% - 97.5%	Guilt Coeff	CI 2.5% - 97.5%	Shame Coef	CI 2.5% - 97.5%
Intercept	0.686*	[0.032, 1.038]	0.618*	[0.335, 0.891]	2.673*	[2.325, 3.010]	1.651*	[1.318, 1.965]
Age	0.001	[-0.001, 0.003]	0.001	[-0.001, 0.003]	0.002	[-0.001, 0.004]	0.005*	[0.002, 0.007]
Group	- 0.052	[-0.134, 0.033]	- 0.079*	[-0.157, -0.001]	- 0.244*	[-0.332, -0.155]	- 0.172*	[-0.275, -0.069]
Gender	- 0.021	[-0.102, 0.058]	0.199*	[0.133, 0.268]	0.144*	[0.069, 0.220]	0.168*	[0.087, 0.248]
Language	- 0.003	[-0.018, 0.012]	- 0.005	[-0.019, 0.008]	0.025*	[0.009, 0.042]	0.027*	[0.010, 0.045]
M Bullying	0.213*	[0.047, 0.378]	X		- 0.304*	[-0.443, -0.162]	X	
C Bullying	0.265*	[0.060, 0.472]	X		- 0.045	[-0.240, 0.158]	X	
M Victimization	0.356*	[0.210, 0.510]	0.526*	[0.377, 0.686]	X		0.265*	[0.117, 0.416]
C Victimization	0.079	[-0.134, 0.309]	0.308*	[0.067, 0.552]	X		0.116	[-0.087, 0.333]

Note. Coeff = Coefficients; Group (Hearing = 0; DHH = 1); Gender (boy = 0; girl = 1); *p* < .05. An X means that these relationships were not included in the model.

For Anger, the GLM revealed a significant effect of Mean and Change score of Bullying and Mean score of Victimization (b = .213, 95% CI = .047, .378, b = .265, 95% CI = .060, .472, and b = .356, 95% CI = .210, .510 respectively). Higher Mean scores for Bullying and Victimization were related to an increase in Anger. An increase in Bullying was related to an increase in Anger.

For Fear, an effect for Gender was found (b = .199, 95% CI = .133, .268), indicating that girls had higher levels of fear compared to boys. Additionally, DHH adolescents reported less fear than their hearing peers (b = -.079, 95% CI = -.157, -.001). Both significant Mean and Change effects for Victimization were found (b = .526, 95% CI = .377, .686, and b = .308, 95% CI = .067, .552 respectively), indicating that higher levels of Victimization lead to more Fear, and that when Victimization increased, the level of Fear also increased.

Guilt and Shame were found to increase with Language and a significant effect was found for Group (b = -.244, 95% CI = -.332, -.155, and b = -.172, 95% CI = -.275, -.069 respectively), indicating that DHH adolescents reported lower levels of these emotions. Both Guilt and Shame were more often reported by girls than boys (b = .144, 95% CI = .069, .220, and b = .168, 95% CI = ..087, .248 respectively). In addition, Shame was found to increase with Age (b = .005, 95% CI = .002, .007). For Guilt, a significant effect was found for the Mean score of Bullying (b = -.304, 95% CI = -.443, -.162), indicating that Bullying is related to a decrease in Guilt. The Mean score of Victimization was related to an increase in Shame (b = .265, 95% CI = .117, .416), indicating that Victimization is related to an increase in Shame.

Group differences within DHH subgroups
For a detailed overview of the DHH group, we examined whether different DHH subgroups (i.e., Type of education by Type of hearing device) differed in personal characteristics: Age, Gender distribution, IQ, Language and Parental education level. See Table 2 in the Supplementary Appendix for detailed participant information per DHH subgroup.

A one-way ANOVA was conducted to compare 4 subgroups of DHH adolescents, depending on their Hearing device (Hearing Aid (HA) versus Cochlear Implant (CI)) and type of education (mainstream versus special education) for their scores on Bullying and Victimization (Table 6). The outcomes indicated that adolescents with a HA in special education reported more victimization than the HA group in mainstream education (Bonferroni correction applied). No other group differences were found.

Table 6. Means (T1/T2) of Bullying and Victimization per DHH group by Hearing Device and Type of Education.

	Hearing Aid		Cochlear implant	
	Mainstream education	Special education	Mainstream education	Special education
No. of participants	32	21	16	11
Bullying	1.39	1.60	1.43	1.44
Victimization	1.38[a]	1.69[b]	1.48[ab]	1.42[ab]

Note. Letter superscripts indicate significant differences between the DHH subgroups for that variable, $p < .05$.

DISCUSSION

This study assessed how emotional experience is related to bullying and victimization over time in DHH and hearing adolescents. Importantly, the relations that we found were irrespective of hearing status. As expected, higher levels of anger and lower levels of guilt contributed to more bullying nine months later. In turn, higher levels of bullying contributed to higher levels of anger and less guilt over time. Regarding victimization, adolescents who reported higher levels of fear, anger, and shame were also bullied more often when they were questioned again nine months later; also these relationships were reciprocal. Moreover, adolescents who bullied more over time, increased in anger; and, increased anger was related to more bullying. This kind of reciprocal relationship also appeared for fear and victimization. We will discuss the theoretical and practical implications of our findings below.

First, the fact that the relationships for emotional functioning and bullying/victimization did not differ between the DHH and hearing groups suggests that the developmental patterns for bullying and victimization are similar, although mean scores differed between adolescents with or without hearing loss. Hearing adolescents reported higher levels of bullying, versus higher levels of victimization in the DHH population. Yet, further inspection revealed that especially DHH adolescents with a Hearing Aid (HA) in Special Education felt victimized more often. To date, there are only a few studies on bullying in DHH adolescents, but those studies confirm more victimization specifically for DHH children in special education (Pinquart & Pfeiffer, 2015; Sullivan, 2006; Weiner et al., 2013). Note that especially DHH adolescents with more emotional, behavioral and language problems go to special education, which could also explain higher levels of victimization. In addition, DHH children with a CI might have better auditory input in combination with a much more extended rehabilitation program for the child and the family, compared to DHH adolescents with a HA (McConkey-

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Robbins, 2000). However, the subsamples in our study were relatively small and only give an indication of possible differences between these groups. Future studies should look into this issue more closely. Since higher language levels protected against victimization, differences in language levels between these subgroups might have also affected these outcomes. Specifically, DHH adolescents in special education displayed lower levels of language.

Second, the literature is scant on empirical evidence regarding reciprocal relationships between emotion experience and bullying / victimization. Interestingly, this study not only confirmed the importance of anger and fear, but also the social emotions of guilt and shame on the development of bullying and victimization. The outcomes showed that all relationships went both ways. Regarding victimization, these outcomes were, as expected, based on the existing literature: stronger emotional reactivity (fear and anger) and higher levels of shame could make an adolescent an easy and rewarding target for a bully. Conversely, being bullied can create feelings of shame for being judged and devalued by peers, and for appearing with an unwanted identity; but it may also evoke fear of being harassed again and anger about the injustice (Duarte et al., 2015; Irwin et al., 2016). Regarding bullying, the literature to date has shown that higher levels of anger and lower levels of guilt result in more bullying behavior (Espelage et al., 2001; Sticca & Perren, 2015). More importantly, we identified opposite patterns: bullying seems to lead to higher levels of anger and lower levels of guilt over time. This supports the 'desensitization theory', which states that repeated exposure to or participation in aggressive behaviors can make the individual insensitive to aggression and to the harm it can cause the victim (Bushman & Anderson, 2009; Thomas, Horton, Lippincott, & Drabman, 1977). It is possible that higher levels of anger and lower levels of guilt make the aggressor feel more justified about his or her acts of aggression (Mazzone et al., 2016; Thornberg et al., 2015).

This study has several strengths: a large sample size of DHH adolescents, two measurement points, and statistical analyses that can account for challenges associated with longitudinal data, such as missing values and dependency between variables. Moreover, it provides evidence for the reciprocal, longitudinal effects of emotions on behavior, which is a novelty in research on the field of bullying. There are also some limitations that should be noted. First, this study included measurements for the general experience of basic and social emotions, as opposed to those aimed at bullying/ victimization situations in particular. Second, the chosen age range was very appropriate because bullying behaviors are most prevalent in this period of life (Björkqvist et al., 1992; Solberg & Olweus, 2003). However, bully or victim roles may be established at an earlier age.

In conclusion, we did find that DHH adolescents are victims of bully behavior more often than their hearing peers, yet the development of bullying/victimization in relation to basic and social emotions occurred in the same way, regardless of hearing status. Emotions play an important role in the emergence and consequences of bullying/ victimization, and this points to the importance of developing an adaptive and varied pattern of emotion regulation strategies for youth with and without hearing loss. A next step in this line of research would be to examine the extent to which intervention programs developed to tackle bullying will also work for the DHH population, or whether special adaptations would be necessary.

Teachers confronted with bullying and/or victimization in their classroom could pay more attention to an emotionally open climate in their classroom, in which children respect and allow each other's emotions in various social situations. For example, the steps described in emotional coaching by Gottman and DeClaire (1997), although focused on the parent – child relationship, might also be effective in a classroom. These steps of emotional coaching emphasize the importance of giving space to another child's feelings, but also appreciating these feelings, and responding adaptively to them. Appreciating the fact that different peers can have different perspectives and consequent feelings in the same (conflict) situation, will enhance adaptive emotion communication. This will prevent emotions rising too high, or prevent continuation of intense (negative) feelings. The positive effects from improved emotion regulation and communication in the classroom between peers on bullying/victimization should be considered in future studies.

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The roles of social emotions and social access in the development of aggression;
A longitudinal study in adolescents with and without hearing loss.

Chapter 6

The Roles of Social Emotions and Social Access in the Development of Aggression: A Longitudinal Study in Adolescents with and without Hearing Loss

ABSTRACT

This longitudinal study examined how social emotions (shame, guilt) and social access contribute to the development of reactive and proactive aggression in adolescence. Using a quasi-experimental design, adolescents with and without hearing loss (n = 80; Mage = 11.9; n = 227; Mage = 11.6 respectively, range 9-16y) completed self-reports on three occasions (9 months interval). Mixed model analyses revealed that aggressive behaviour decreased with age, whereas shame and guilt peaked in adolescence. Adolescents with hearing loss showed protracted development for guilt. In both groups, shame contributed to an increase in reactive aggression, whereas guilt contributed to a decrease in proactive aggression. These longitudinal associations highlight the unique role that shame and guilt play in the development of aggression.

INTRODUCTION

Aggression is any form of behaviour that has the goal of harming or injuring someone else (Bushman & Anderson, 2001). Although levels of aggression remain relatively stable throughout the life span, there seems to be a temporary increase during adolescence (e.g., Petersen, Bates, Dodge, Lansford, & Pettit, 2015). Aggressive adolescents are at a higher risk for psychopathology and social maladaptation, including delinquency, substance abuse, and peer rejection (Barnow, Lucht, & Freyberger, 2005; Martin-Storey, Serbin, Stack, Ledingham, & Schwartzman, 2011; Ostrov & Crick, 2007). The role of social emotions (e.g., shame and guilt) has often been emphasized in the etiology of aggression (Malti & Krettenauer, 2013). Social emotions can be thought of as "gate keepers" for a better society (De Waal, 2009). For example, anticipation of the negative feeling of guilt is usually enough to prompt an individual to think twice before harming someone else. In other words, these social emotions tend to make us behave within the limits set by society, and as "good citizens" who respect other peoples' integrity and possessions. Yet the relation between the development of social emotions and the development of aggression in adolescents is currently unknown.

A contributing factor to the relation between social emotions and aggression is one's degree of access to the social world. Adolescents with hearing loss face a unique developmental situation, providing an opportunity to examine the role of social access through quasi-experimental techniques. Most adolescents with hearing loss grow up in a predominantly hearing world, with hearing families. Communication is generally less frequent and of a lower quality, between children with hearing loss and their hearing family members or care-givers (Ambrose, Walker, Unflat-Berry, Oleson, & Moeller, 2015). These adolescents therefore have fewer opportunities to engage in either explicit or incidental learning, due to the limits their hearing loss imposes on overhearing others in noisy environments, on language skill development, and on the overall level of communication (Lederberg, Schick, & Spencer, 2013; Tomblin et al., 2015). Consequently, these communication difficulties affect the social-emotional adjustment of these children.

Social emotions can only be learned within a social environment through observation, modelling, and verbal transmission (Eisenberg, 2000). Therefore, the development of social emotions could prove challenging for those with limited social access, as is the case for adolescents with hearing loss. In the present study, we compared adolescents with and without hearing loss, to examine the role of social access in the development of aggression. The aims of the present study were to examine and compare (1) the development of aggression and social emotions in adolescents with and without hearing loss, and (2) the extent to which social emotions contribute to the development of aggression in each group.

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Two subtypes of aggression

Research on aggression differentiates between reactive aggression and proactive aggression, due to underlying differences in motives (Cima, Raine, Meesters, & Popma, 2013; Kempes, Matthys, de Vries, & van Engeland, 2005). Reactive aggression is a defensive response to perceived provocation or threat. This hot-tempered, impulsive type of aggression is accompanied by negative affective states, such as frustration and anger. In contrast, proactive aggression is goal-oriented, and motivated by the desire to obtain a desired outcome (Bandura, 1973; Dollard, Doob, Miller, Mowrer, & Sears, 1939). It occurs in the absence of provocation and emotional arousal.

Previous studies generated support for a differential link between reactive and proactive aggression, respectively, and children's social information processing (SIP model: Arsenio, Adams, & Gold, 2009). That is, a bias in interpreting social cues predicts the development of reactive aggression, but not proactive aggression. In particular, misinterpreting others' intentions as hostile in ambiguous or benign social situations relates to higher levels of reactive aggression (Dodge & Coie, 1987; Orobio de Castro, Veerman, Koops, Bosch, & Monshouwer, 2002). In contrast, proactive aggression is linked to biases toward instrumental over interpersonal goals, and to positive expectations about obtaining instrumental goals by means of aggression (Hubbard, Dodge, Cillessen, Coie, & Schwartz, 2001).

A higher incidence of aggression has been reported in adolescents with hearing loss (e.g., Chao et al., 2015; Van Eldik, 2005).Yet these studies did not differentiate between reactive and proactive aggression. Adolescents with hearing loss may be at higher risk for developing reactive aggression, because they attribute twice as many hostile intentions to story characters in ambiguous and benign social situations as their hearing peers (Torres, Saldana, & Rodriguez-Ortiz, 2016). Furthermore, adolescents with hearing loss also seem to infer that relationships are not necessarily harmed by anger or aggression (Rieffe & Terwogt, 2006; Torres et al., 2016). In contrast to hearing peers, adolescents with hearing loss did not think their friendships would be jeopardized if they were to express their anger in a peer conflict situation (Rieffe & Terwogt, 2006). In a study by Torres and colleagues (2016), adolescents were shown videos in which a protagonist acted aggressively towards a peer. Adolescents with hearing loss thought that their peers would be less inclined to reject them if they were to display aggressive behaviour, compared to their hearing peers.

The experience of shame and guilt

Whether children and adolescents anticipate positive emotions (e.g., happiness) or negative emotions (e.g., shame or guilt) following imagined moral transgressions is an important predictor of aggression (Arsenio, Preziosi, Silberstein, & Hamburger, 2012;

Krettenauer & Eichler, 2006). The expectation that wrongdoers will experience positive emotions is associated with higher levels of aggression, while the expectation that one will experience negative emotions following a moral transgression turns aggression into a less desirable behavioural alternative (for a meta-analysis see Malti & Krettenauer, 2013). The happy victimizer phenomenon occupies a well-known childhood phase in the development of emotion attributions. Although children around the age of four acknowledge that moral transgressions are wrong, they nevertheless attribute solely positive feelings to the wrongdoer (Arsenio, Gold, & Adams, 2006). In middle childhood, children start to anticipate negatively charged self-conscious emotions (e.g., shame and guilt) to the wrongdoer, due to an increased focus on others' emotions and perspectives (Sokol & Chandler, 2003). However, longitudinal studies indicate that emotion attributions following moral transgressions are still developing during adolescence. Negative emotion attributions become more frequent throughout adolescence and early adulthood (Krettenauer, Colasante, Buchmann, & Malti, 2014; Nunner-Winkler, 2009).

Results of cross-sectional studies examining the link between aggression and shame attributions (i.e., the fear of being negatively evaluated by others) in adolescents have been inconsistent. Some studies have indicated that shame is an unpleasant emotion, and mere anticipation of shame prevents aggressive behaviours (Olthof, 2012; Roos, Salmivalli, & Hodges, 2011). However, others have found that shame attributions are related to higher levels of aggression (Stuewig, Tangney, Heigel, Harty, & McCloskey, 2010). Yet the distinction between reactive and proactive aggression could explain these inconsistent findings regarding shame. Given that ashamed individuals feel judged, and are worried about damage to their image in front of others, they may react with hostility and aggression toward disapproving others, as a means of protecting self-esteem and reinforcing a sense of superiority (Thomaes, Stegge, Olthof, Bushman, & Nezlek, 2011). This would hint at an increase in reactive aggression. However, in the absence of feeling 'attacked' by others, shame could evoke a feeling of having harmed one or more others, thus contributing to a decrease of proactive aggression.

Guilt attribution (i.e., feeling responsible for harm caused to another) in response to wrongdoing is consistently associated with lower levels of aggression in cross-sectional studies (e.g., Stuewig et al., 2010). Guilt attributions reflect the anticipation that one's actions have negative consequences for others. This consideration, combined with the anticipated unpleasantness of guilt, makes it less likely that adolescents will behave immorally or aggressively (Malti, 2016). Moreover, this consequential analysis is more likely to occur in unprovoked situations. Therefore, higher levels of guilt are linked to lower levels of proactive aggression, specifically (Chaux, Arboleda, & Rincón, 2012; Frick, Cornell, Barry, Bodin, & Dane, 2003).

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To examine whether the development of shame and guilt attribution co-occurs with the development of aggression, longitudinal studies are needed. However, longitudinal studies examining a possible role for shame and guilt attribution in the development of aggression in adolescence are scarce. One study by Roos and colleagues (2014) assessed self-reported shame- and guilt-proneness and peer-nominated aggression at two time points, with a six-month interval. Although shame and guilt were both related to lower levels of aggression at the first measurement occasion, these emotions did not forecast changes in aggression over time (Roos et al., 2014).

Shame and guilt in adolescents with hearing loss

To experience social emotions, one must be able to understand others' perspectives and feeling states. But children with hearing loss are known for their Theory of Mind difficulties, which have been shown to persist into adolescence (Gonzalez, Quintana, Barajas, & Linero, 2007; Ketelaar, Wiefferink, Frijns, Broekhof, & Rieffe, 2015). Not surprisingly, these impairments are also related to children's communication skills (Netten et al., 2017). Overall, children without hearing loss who participated in more talk about others' perspectives achieved higher levels of moral reasoning (Dunn, Brown, & Maguire, 1995). Thus, communication about the social world around the child is crucial to the development of social emotions. But many children with hearing loss cannot access this kind of full communication. Few cross-sectional studies have indicated a lower level of shame and guilt in adolescents with hearing loss (Ketelaar et al., 2015; Peterson, 2016).

The present study

In this longitudinal study, adolescents between 9 and 16 years old, with and without hearing loss, completed self-report questionnaires on three measurement occasions. An advantage of this quasi-experimental longitudinal design was that we could examine the role of social emotions alongside the role of social access (i.e., through group comparisons) in the development of aggression.

The first aim of this study was to compare the levels and development of aggression and social emotions between adolescents with and without hearing loss. We expected higher levels of reactive and proactive aggression, and lower levels of social emotions in adolescents with hearing loss compared to their hearing peers (Chao et al., 2015; Ketelaar et al., 2015; Peterson, 2016). For both groups, we hypothesised increases in the level of reactive and proactive aggression (Petersen et al., 2015). In addition, we expected shame and guilt to increase throughout adolescence (Krettenauer et al., 2014), but at a slower pace in adolescents with hearing loss, as compared to hearing adolescents.

The second aim of this study was to examine the extent to which social emotions

contributed to the prediction of reactive and proactive aggression in adolescents with and without hearing loss. Based on previous cross-sectional studies, we expected shame to contribute to an increase in reactive aggression (Thomaes et al., 2011), and both shame and guilt to contribute to a decrease in proactive aggression (Chaux et al., 2012; Frick et al., 2003). Finally, we expected these relations to be similar in adolescents with hearing loss and without hearing loss.

METHOD

Participants
80 adolescents with hearing loss and 227 adolescents without hearing loss participated in this study (see Table 1). The data presented here are part of a longitudinal study on the social-emotional development of adolescents with hearing loss. Cross-sectional studies were previously presented for example by Kouwenberg and colleagues (2012) and Theunissen and colleagues (2011). Detailed information on the population with hearing loss that is studied longitudinally can be found in Broekhof and colleagues (2018).

Adolescents with hearing loss were recruited via ENT departments of hospitals, special needs schools, speech and hearing centres, and magazines or websites. Inclusion criteria for adolescents with hearing loss were an unaided hearing loss of at least 40dB in the better ear, detected pre- or perilingually. Adolescents without hearing loss were recruited from primary and secondary schools in the Netherlands. Inclusion criteria for both adolescents with and without hearing loss were 1) age between 9 and 16 years at Time 1 (T1), 2) normal intellectual functioning, 3) no diagnosed developmental disabilities or learning difficulties, and 4) living in the Netherlands or the Dutch speaking part of Belgium. The two groups did not differ in terms of terms of age at T1, gender distribution, IQ, language, or parental education level (see Table 1).

Materials
Instrument for Reactive and Proactive Aggression (IRPA) Self-Report (Rieffe et al., 2016): Adolescents were asked to report their aggressive behaviours from the previous four weeks on a three-point scale (1 = never, 2 = sometimes, 3 = often). The questionnaire consisted of two scales: reactive and proactive aggression. Aggressive behaviours were defined as three forms of physical aggression (i.e., kicking, hitting and pushing) and two forms of relational aggression (i.e., name calling and picking fights). To differentiate between reactive and proactive aggression, adolescents were asked to report on their motives: there were three reactive motives (i.e., "I was mad", "I was bullied", or "I struck back") and three proactive motives (i.e., "I wanted to be mean", "I took pleasure out of

Table 1. Demographic characteristics of participants.

	HL	Hearing
No. of participants	80	227
Age in years at T1		
Mean (*SD*)	11.91 (1.62)	11.63 (1.38)
Range	9.17-15.75	9.08-14.75
Gender – *n* (%)		
Male	37 (46.3)	96 (42.3)
Female	43 (53.8)	131 (57.7)
IQ score (*SD*)	10.19 (2.67)	10.61 (2.48)
Language score (*SD*)	10.29 (3.30)	10.32 (2.30)
Parental education level† (*SD*)	3.21 (.72)	3.17 (.66)
Type of education – *n* (%)		
Regular education	48 (60.0)	227 (100.0)
Special education	32(40.0)	0
Communication mode – *n* (%)		
Dutch Sign Language /Sign Supported Dutch	28 (35.0)	
Spoken Language only	52 (65.0)	
Type of amplification - *n* (%)		
Hearing aid	53 (66.3)	
Cochlear implant (CI)	27 (33.3)	
Hearing loss in best ear – *n* (%)		
40-60 dB	20 (25.0)	
61-90 dB	18 (22.5)	
> 90 dB	36 (45.0)	
Unknown	6 (7.5)	

†The highest level of education of each parent was categorized on a scale ranging from one to four. Social economic status was calculated by averaging these two scores. *Abbreviations:* HL: Hearing loss; SD: Standard Deviation; T = Time.

it", or "I wanted to be the boss"). Total scores were calculated per scale. The internal consistencies of the scales were sufficient, ranging from .67 to .92 (see Table 1 of the Supplementary Appendix for Cronbach's alphas).

Brief Shame and Guilt Questionnaire (BSGQ; Novin & Rieffe, 2015): Adolescents were asked to imagine themselves occupying a described scenario, and asked to rate how ashamed or guilty they would feel on a three-point scale (1 = not at all, 2 = a little, 3 = a lot). The questionnaire consisted of 12 social emotion-eliciting vignettes. In six vignettes, participants were asked to indicate how ashamed they would feel, and in the

other six, they were asked how guilty they would feel (e.g., Shame: "You get a very bad grade in school"; Guilt: "There is one cookie left in the cookie jar. You quickly put it in your mouth. Now your friend does not have a cookie"). Total scores were calculated per scale. The internal consistencies of the scales were sufficient, ranging from .68 to .81 (see Table 1 of the Supplementary Appendix for Cronbach's alphas).

Procedure

We administered self-report questionnaires to participants at all three time points with intervals of approximately 9 months (Interval T2-T1: $M = 9.3$ months; $SD = .91$; Interval T3-T2: $M = 9.9$ months; $SD = 1.15$). Questionnaires were administered individually in a quiet room at the participant's school or home. Participants were seated in front of a computer, and questions were presented one by one. For adolescents with hearing loss, all instructions and questions were accompanied by a video providing a translation in Dutch Sign Language. We emphasized that we would keep all their answers confidential. We obtained parental informed consent and ethical approval of Leiden University for the study.

Statistical Analyses

To compare levels and development of aggression and social emotions between adolescents with and without hearing loss, we used Linear Mixed Models (LMM) to deal with the nested structure of our data (i.e., within-child measures). This analytic technique is also appropriate for datasets with missing data (Singer & Willett, 2003). Information about missing data in this study is reported in Table 2 of the Supplementary Appendix. First, we assessed general group differences, the development of our study variables over time, and whether these developmental trajectories differed between adolescents with and without hearing loss. Using a formal modelling procedure, we fitted an unconditional means model with a fixed and random intercept. In the next step, we added group (i.e., 0 = without hearing loss, 1 = with hearing loss). In addition, we added age (centered around 9.08 years, youngest participant of the current sample) and examined three models of change: linear, quadratic, and cubic models, respectively. We added a random slope effect for the best age model, but this did not improve model fit for any model. In the last step, we added interaction with group to assess differences between groups in developmental trajectories. Preferred models had lower Akaike Information Criterion (AIC) and Bayesian Information Criterion (BIC) values. To compare whether AIC and BIC values of a subsequent model were significantly lower, the AIC and BIC values of this model were compared to the values of the model of the previous step (i.e., nested models differing one degree of freedom) using a log likelihood ratio test.

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Second, LMM models were used to assess whether shame and guilt contributed to the linear development of reactive and proactive aggression. First, we used baseline levels (i.e., score at T1) and change levels (i.e., change over time: T1-T1, T2-T1, and T3-T1), and included the best fitting age-model, group and gender (0 = boy, 1 = girl) in the analyses. In the second step, interactions with Group were added. Again, we made a comparison between nested models by comparing AIC and BIC values (i.e., significant lower values indicate better fit). All analyses were performed in SPSS version 24.0. Graphs were made in R version 3.4.3 using the Ggplot2 function.

RESULTS

Intraclass correlations

Intraclass correlations (ICC) were calculated to test nesting of observations within individuals across the three time points. We used a two-way mixed effects model with a measure of absolute agreement and interpreted average measures. ICC were good with values of .760 for reactive aggression, .732 for proactive aggression, .765 for shame, and .787 for guilt. Pearson correlations between the averages of all study variables (i.e., of T1, T2, T3) are displayed in the Supplementary Appendix.

Developmental trajectories and group differences

The outcomes for the best fitting model of the multilevel analyses are displayed in Table 2 (see Supplementary materials Table 3 for an overview of all fitted models). Individual variation is observed in the intercepts of reactive aggression, proactive aggression, shame, and guilt (see Figure 1 of the Supplementary materials).

Reactive aggression and proactive aggression were both best explained by a negative linear age-model, indicating that both types of aggression decreased over time (see Figure 1A and 1B). We found no group differences for reactive aggression ($b = .97$, $p = .084$), but adolescents with hearing loss displayed higher levels of proactive aggression ($b = 1.47$, $p < .001$) compared to hearing adolescents (see Table 2).

The developmental trajectories of shame and guilt were best explained by a quadratic age-model. As can be seen in Figure 1C and 1D, this suggests that shame and guilt peak in early adolescence. Moreover, for guilt, the optimal fitting model also included an age (quadratic) x group interaction, indicating that guilt peaks later in adolescents with hearing loss compared to adolescents without hearing loss (see Figure 1D). As expected, adolescents with hearing loss reported lower levels of shame ($b = -.93$, $p < .001$) and lower levels of guilt ($b = -.2.53$, $p < .001$; see Table 2).

Table 2. Linear mixed models examining group differences and the developmental trajectory of reactive aggression, proactive aggression, shame, and guilt.

Best fitting model	AIC/BIC	Intercept (se)	Group (se)	Age linear (se)	Age quadratic (se)	Group x Age (se)
Reactive aggression	4759/4769	20.92 (.51)***	.97 (.56)	-.38 (.13)**	-	-
Proactive aggression	3971/3981	16.77 (.30)***	1.47 (.33)***	-.23 (.08)**	-	-
Shame	3741/3751	12.28 (.40)***	-.93 (.31)**	1.25 (.22)***	-.16 (.03)***	-
Guilt	3558/3568	13.15 (.36)***	-2.53 (.56)***	.80 (.20)***	-.12 (.03)***	.36 (.14)*

Note. Abbreviations: AIC = Akaike information criterion; BIC = Bayesian Information Criterion. Group: 0 = hearing, 1 = hearing loss.
*$p < .05$, **$p < .01$, ***$p < .001$.

Table 3. Results of the linear mixed model on the effect of social emotions on aggression.

	Reactive aggression		Proactive aggression	
Fixed effects				
Intercept	6.701***		14.824***	
Age	- .219		- .114	
Group	.010		.094**	
Gender	- .600		.934	
	Baseline	**Change**	**Baseline**	**Change**
Reactive aggression	-	-	.253***	.243***
Proactive aggression	.714***	.629***	-	-
Shame	.174#	.183*	- .004	- .029
Guilt	.005	.038	- .239***	- .179***
Random effects				
ID	10.98		4.35	
AIC/BIC	4572.78/4582.12		3785.80/3795.14	
df	12		12	

*$p \leq .05$, **$p \leq .01$, ***$p \leq .001$; gender: 0 = boys, 1 = girls. #$p = .058$
Note. Adding group interactions with shame and guilt did not improve both models.
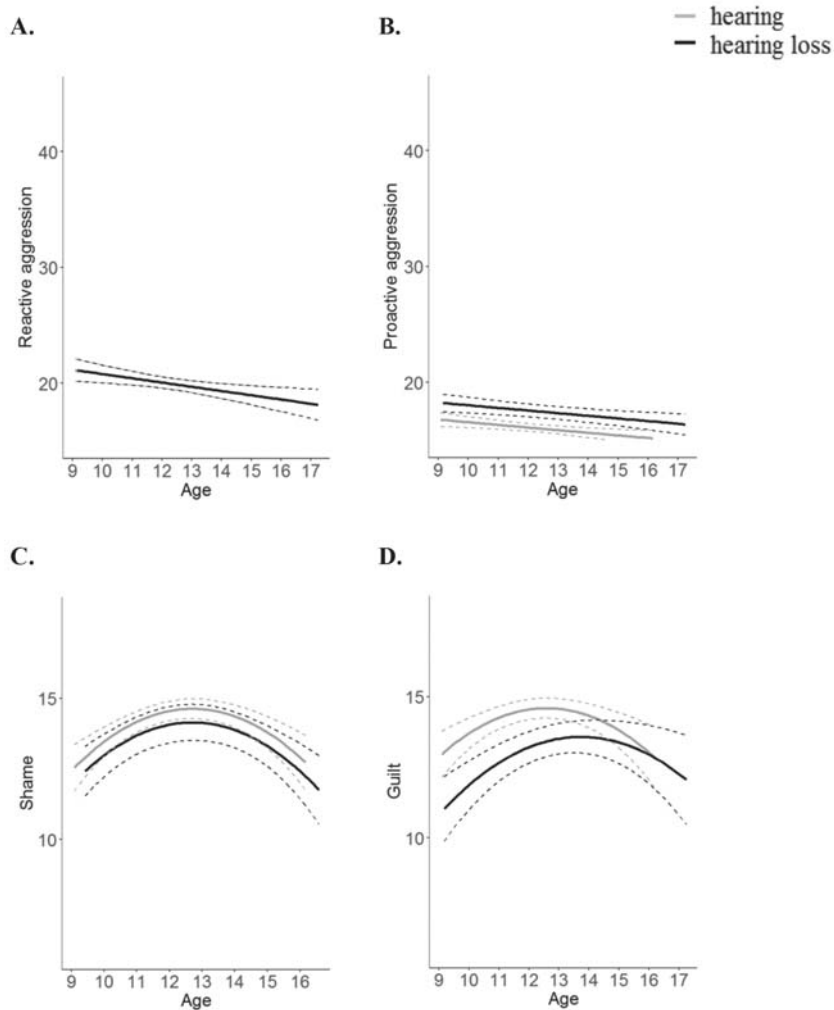
Figure 1. Longitudinal graphic representation of the predicted values based on the optimal fitting model for **1A.** reactive aggression, **1B.** proactive aggression, **1C.** shame, and **1D.** guilt. Lines for hearing adolescents are displayed in grey and lines for adolescents with hearing loss are presented in black. Dotted lines represent 95% confidence interval.

Risk and protective factors for the development of reactive and proactive aggression
LMM models were used to examine the predictive value of shame and guilt for the linear development of aggression. For both reactive and proactive aggression, the model without interactions fitted the data best.

As shown in Table 3, the change level for shame contributed to an increase in reactive aggression, controlling for proactive aggression. So, an increase in shame relative to T1 was associated with an increase in reactive aggression. In addition, the baseline level of shame also marginally contributed to an increase in reactive aggression ($p = .058$).

For proactive aggression, the baseline level and change in guilt contributed to a decrease in proactive aggression, controlling for reactive aggression (see Table 3). So, higher levels of guilt and an increase in guilt relative to T1 were associated with a decrease in proactive aggression.

DISCUSSION

Adolescence is an important transition phase from childhood to adulthood, marked by increasing responsibility to regulate one's own behaviour, and growth in social awareness (for reviews see Blakemore, 2008; Farley & Kim-Spoon, 2014). Externalizing behaviours peak during adolescence and social emotions become part of everyday social exchange (Lansford, 2018; Petersen et al., 2015; Zeman, Cassano, Perry-Parrish, & Stegall, 2006). However, very few studies have examined the development of specific types of aggression during adolescence, or how social emotions contribute to the development of adolescent aggression (Barker, Tremblay, Nagin, Vitaro, & Lacourse, 2006; Roos et al., 2014). In the current three-wave longitudinal study, we tested: 1) the development of reactive aggression, proactive aggression, and social emotions across adolescence, and 2) the longitudinal contribution of social emotions to the development of both types of aggression. To assess the role of social access in these developmental patterns and interrelations, we compared adolescents with and without hearing loss.

The present study yielded several main findings, which are discussed below. Reactive and proactive aggression declined throughout adolescence. When examining how levels of self-reported social emotions contributed to this linear development, we found that higher levels of shame were related to increasing levels of reactive aggression over time, whereas increasing levels of guilt were related to decreasing levels of proactive aggression. These outcomes highlight the importance of differentiating between specific types of aggression in relation to guilt and shame. The developmental trend of aggression and the longitudinal associations of social emotions with aggression applied to both adolescents with and without hearing loss. However, the influence of social access became apparent through higher levels of proactive aggression and lower levels of social emotions in adolescents with hearing loss. In addition, although social emotions peaked in early adolescence in both groups, guilt peaked later in adolescents with hearing loss, compared to their peers without hearing loss.

Aggression

The finding that reactive and proactive aggression linearly declined over time did depart from our expectation. Nevertheless, this is partly in line with previous studies

examining the development of aggression, specifically. Based on large scale longitudinal studies on the development of externalizing behaviours, it was concluded that aggression increases during adolescence, as compared to middle childhood and adulthood (Lansford, 2018; Petersen et al., 2015). Yet, these studies often examined an aggregate score for antisocial and risk taking behaviours that included aggression, but also delinquency, disobedience, and disruptive behaviour. While aggression merely involves behaviours that inflict harm to others (e.g., pushing, fighting, and name calling), antisocial behaviours include many behaviours that are socially undesirable, but do not necessarily harm anyone. The scarce number of studies in which the development of aggression is examined specifically reported either stability over time (Barker et al., 2006; Kokko, Pulkkinen, Huesmann, Dubow, & Boxer, 2009) or a decrease in aggression during adolescence (Barker et al., 2006; Bongers, Koot, van der Ende, & Verhulst, 2004; Vierikko, Pulkkinen, Kaprio, & Rose, 2006). Aggregating aggression in the broader classes of risk taking and antisocial behaviours possibly contaminated earlier conclusions, which stresses the need for future studies in the developmental course of aggression (Tremblay, 2000).

Risk and protective factors in the development of aggression
Importantly, we show that more shame is uniquely associated with higher levels of reactive aggression, and more guilt is uniquely associated with lower levels of proactive aggression. Moreover, a decrease in shame contributed to a decrease in reactive aggression, whereas an increase in guilt contributed to a decrease in aggression over time. These findings support the need for longitudinal research, as changes in social emotions contribute to changes in aggression over time. In addition, these findings highlight the importance of differentiating between reactive and proactive aggression in relation to shame and guilt. Possibly due to the distinction between these two types of aggression, we were able to confirm with a longitudinal design that shame and guilt are influential in the development of these specific types of aggression. A previous longitudinal study used only an aggregate score of reactive and proactive aggression (Roos et al., 2014), potentially masking the unique longitudinal associations evident when reactive and proactive aggression are examined separately since our findings now also indicate that shame is unrelated to proactive aggression and guilt is unrelated to reactive aggression.

Our finding that adolescents with higher levels of shame reported increasing levels of reactive aggression adds to previous cross-sectional studies. The main theory about the path from shame to aggression posits that exposing adolescents to a shameful event initiates fury, paving the way for aggressive behaviours (Thomaes et al., 2011). It is beyond dispute that ashamed individuals are in a highly aroused state, either

experiencing elevated levels of social pain or anger, hence shame's link to reactive aggression (Lewis, 1971).

It was unexpected that shame played no discouraging role in the development of proactive aggression (Olthof, 2012). This might be caused by conceptual overlap, i.e., the shared variance of guilt and shame. Correlations to test this hypothesis confirm that shame correlated with proactive aggression when guilt was not included in the analysis to parse out this shared variance (see Table 4 of the Supplementary Appendix). This confirms that shame is only negatively associated with lower levels of proactive aggression when guilt is not accounted for.

To the best of our knowledge, this study is the first to confirm longitudinally that more guilt (higher initial and increasing levels) contributed to a decrease in proactive aggression. That is, adolescents with higher levels of guilt are less inclined to behave aggressively without being provoked, because of the negative emotional consequences of aggressive behavior for themselves. As expected, there were no longitudinal associations between guilt and reactive aggression. There are several possible explanations why guilt attributions are not related to the development of reactive aggression. Previous research has indicated that emotionally aroused individuals are more likely to act impulsively, reflected by a preference for instant small gratification, even in the face of a delayed negative consequences (Peters, Vastfjall, Garling, & Slovic, 2006; Sohn et al., 2015). Thus, if one feels provoked by someone, it is more tempting to retaliate, even if one anticipates consequential guilt. At the same time, from middle childhood onwards, individuals judge aggression to defend oneself (i.e., reactive aggression) as more morally justifiable than aggression to obtain selfish instrumental goals (i.e., proactive aggression; Jambon & Smetana, 2014). Anticipating the consequences of engagement in reactive aggression would therefore result in less intense guilt attributions, as compared to engagement in proactive aggression, minimizing the protective influence of guilt for reactive aggression.

The unique associations of shame with reactive aggression and guilt with proactive aggression were similar in adolescents with and without hearing loss. Thus, the level of social access does not seem to alter the role of social emotions on the development of aggression. Can lower levels of social emotions therefore explain the higher incidence of proactive aggression in adolescents with hearing loss? Similar to the hearing group, lower levels of guilt were linked to the development of higher levels of proactive aggression in adolescents with hearing loss. Given that levels of guilt were lower for children with hearing loss, it is not surprising that these adolescents were indeed found to have a higher level of proactive aggression. In contrast, we found that higher levels of shame are related to higher levels of reactive aggression. With lower levels of shame, compared to their hearing peers, adolescents with hearing loss do not seem to be at risk for the development of reactive aggression.

6

Developmental patterns of shame and guilt

Guilt and shame peak in early adolescence: the reported intensity of both guilt and shame increase from preadolescence to early adolescence and decrease thereafter into middle adolescence. This quadratic pattern is compatible with studies showing that peer sensitivity is highest around early adolescence (e.g., Steinberg, 2008). Fear of peer rejection, or a strong desire to belong to a peer group, could foster perspective taking abilities and the willingness to behave in accordance with social norms and values (Newman, Lohman, & Newman, 2007; van Hoorn, van Dijk, Meuwese, Rieffe, & Crone, 2016). Early adolescents seem particularly reluctant to harm another peer, or to behave incompetently in the presence of others, indicating higher levels of shame and guilt in this adolescent phase (Reimer, 1996).

Adolescents with hearing loss showed lower levels of social emotions in general, and a more protracted development of guilt, compared to adolescents without hearing loss. This finding highlights the need for social learning. In order for social emotions to arise, there must be an appreciation for the perspectives and feelings of others and an appreciation for social rules and standards (Tangney & Dearing, 2002). Children and adolescents with hearing loss are found to be less aware of others' perspectives and feelings, due to less access to the social world (Jones, Gutierrez, & Ludlow, 2015; Ketelaar et al., 2015). Consequently, adolescents with hearing loss may not foresee the negative evaluations of others, or any negative emotional consequences for others as a result of their aggressive behaviour, making it less likely that guilt and shame will occur.

It remains speculative why the developmental pace of guilt peaks later in adolescents with hearing loss, whereas the developmental pace of shame is in line with adolescents without hearing loss. An explanation may lie in the differences between shame and guilt. Whereas shame is focused on oneself in light of a negative evaluation by others, guilt is focused on the other, thus requiring stronger perspective taking capacity. It could be that the switch from perspective taking with a focus on the self to perspective taking with a focus on the other is more challenging for adolescents with less access to the social world. Future studies need to unravel whether adolescents with less access to the social world could benefit from training in perspective taking abilities, in order to prevent lower levels of social emotions and a slower developmental pace for guilt.

Limitations and strengths

The present study has several strengths, but there are also some limitations that need to be addressed. First, the levels of aggression were generally low in our adolescent sample, as is frequently observed in studies with non-clinical samples (see Figures 1A and 1B; Barker et al., 2006; Roos et al., 2014). Nevertheless, there was sufficient intra-

and inter-individual change to map developmental changes in aggression, and to examine the contribution of shame and guilt to these changes in aggression. Second, this study relied solely on self-report measures, increasing the risk for common-method variance bias (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). Future studies should use varying measurement methods and sources by also including observational measures or peer reports.

Among the strengths of this study is the longitudinal design, with three measurements in early adolescence and approximately 9 months in between. It enabled us to map developmental changes in aggression, and to examine the longitudinal contribution of social emotions to these changes. Another strength of this study is that we adopted a quasi-experimental design, including a large sample of adolescents with hearing loss. This unique approach made it possible to study the role of social access on the development of aggression and social emotions.

CONCLUSION

The current longitudinal study showed that adolescents with and without hearing loss engage in less reactive and proactive aggression as they mature from early to middle adolescence. However, reported levels of proactive aggression are elevated in adolescents with hearing loss. In addition, shame and guilt peaked in early adolescents but adolescents with hearing loss reported lower levels of these social emotions compared to hearing peers. These group differences emphasize the important role of access to the social world in the development of social emotions.

Our study suggests that shame is an important risk factor in the development of reactive aggression, whereas guilt is an important protective factor in the development of proactive aggression for both adolescents with and without hearing loss. Future studies should determine whether promoting perspective taking with the focus on others, as is characteristic for guilt, as opposed to perspective taking with the focus on the self as is characteristic for shame, could provide means for developing interventions that successfully prevent aggressive behaviour in adolescence.

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Chapter 7

General Discussion
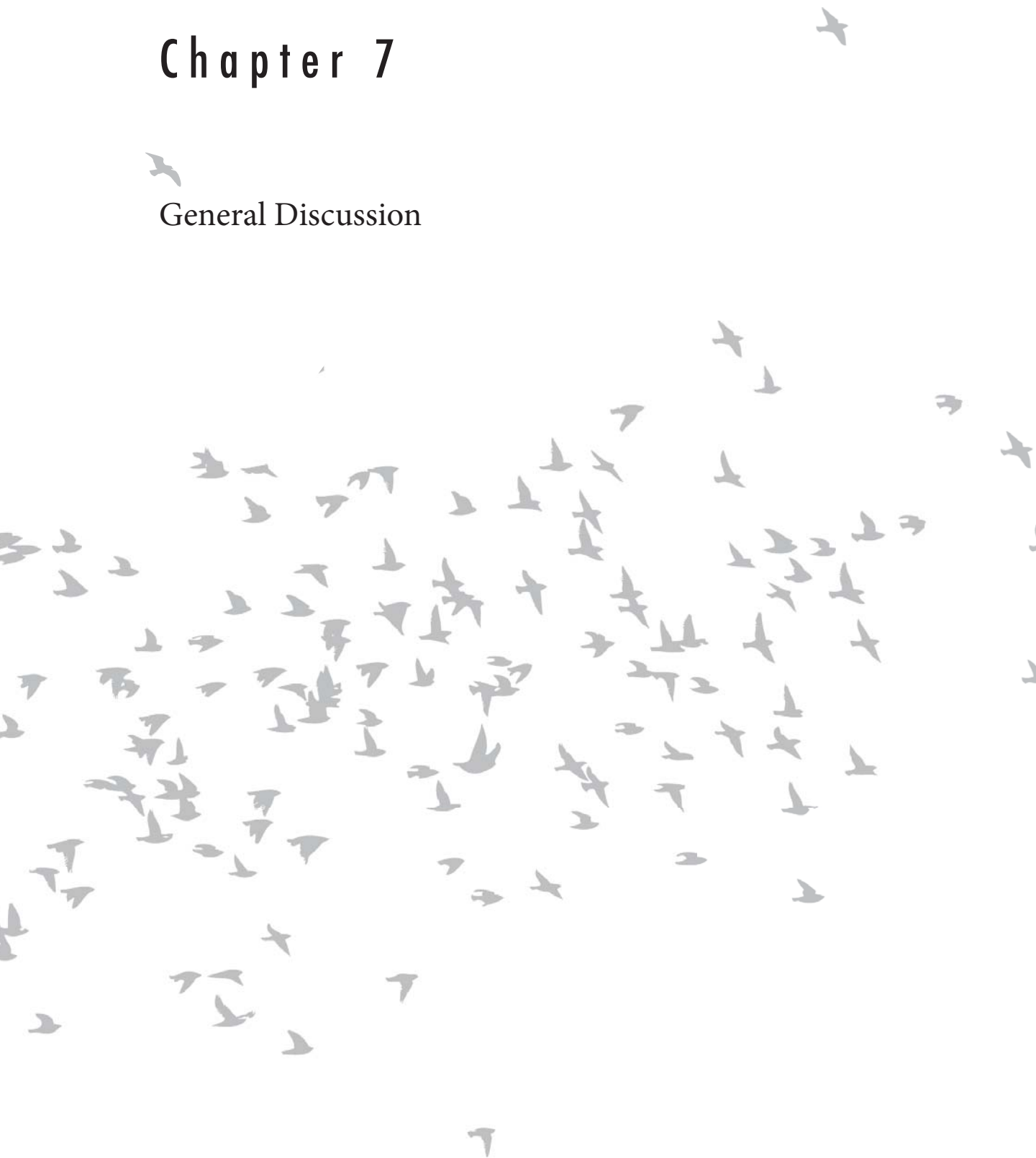
Self-conscious emotions are crucial for children's social development, as these emotions make us aware of norms and values that are necessary for creating and maintaining social harmony. Self-conscious emotions motivate individuals to comply with something more important than their own individual needs, namely a safe and protective social climate (e.g., Beer, Heerey, Keltner, Scabini, & Knight, 2003; Tracy & Robins, 2004). The main aim of this thesis is to enhance our understanding of the role of self-conscious emotions (i.e., shame and guilt) in the development of adolescent aggression. Previous cross-sectional studies have studied the relationship between self-conscious emotions and aggression in this important developmental phase, yet we still lack sufficient understanding of (1) the longitudinal nature of these associations, and (2) the importance of access to and input from the social world for the development of self-conscious emotions. Therefore, this thesis aims to unravel how guilt and shame contribute to the development of adolescent aggression over time, and in addition, to examine the influence of social access on the development of self-conscious emotions and their relations with aggression.

Our hypothesis is that participation in the social world is crucial for the development of self-conscious emotions, and that less access to the social world could therefore be detrimental to this development. It may in this regard affect negative outcomes, such as aggressive behaviour. In this thesis, the influence of access to the social world on the development of self-conscious emotions is modelled using a quasi-experimental design. Two groups with less access to the social world are included: adolescents with an autism spectrum disorder (ASD), and adolescents with hearing loss. These two groups differ greatly from each other regarding causes, neurobiological underpinnings, symptomatology and clinical presentation, yet members of both groups face challenges in achieving access to and participating in the social world.

ASD is a disorder characterized by deficits in social communication and social interaction (American Psychiatric Assocation, 2013). From an early age, children with ASD struggle to engage in social interactions with their parents, thereby reducing the quality and quantity of the child's social experiences (Beurkens, Hobson, & Hobson, 2013). Adolescents and young adults with ASD also have more difficulty participating in the social world, as they have fewer friends and are more socially isolated (e.g., Orsmond, Shattuck, Cooper, Sterzing, & Anderson, 2013). Individuals with hearing loss are restricted in their access to the social world solely due to limitations on access to auditory input. Essentially, children with hearing loss are able to learn everything just as well as hearing children. However, the majority of infants with hearing loss are born to hearing parents who do not use sign-language, leading to communication problems at an early age (Ambrose, Walker, Unflat-Berry, Oleson, & Moeller, 2015; Mitchell & Karchmer, 2004). But also at an older age, with or without hearing

technology, challenges in communication remain. Children and adolescents with hearing loss are less able to access the sounds of interactions between hearing family members and friends, and many acoustic environments pose problems for comprehension (Luckner & Cooke, 2010). Taken together, diminished access to the social world characterizes both individuals with ASD and individuals with hearing loss, which decreases their opportunity to learn from these daily interpersonal social experiences.

The first aim of this thesis was to examine the influence of social access on the development of self-conscious emotions. Theory of Mind (ToM) is an important precursor for the development of self-conscious emotions. Therefore, ToM was examined in young children (one to six years old) with ASD. Levels of shame and guilt in adolescents with ASD and adolescents with hearing loss were assessed through self-reports and compared to a group of matched controls. All adolescents were between nine and sixteen years old. The second main aim of this thesis was to unravel the longitudinal contributions of shame and guilt to the development of adolescent aggression in three groups: adolescents with ASD, adolescents with hearing loss, and typically developing adolescents. To this end, these self-conscious emotions and aggression (i.e., bullying, reactive aggression, and proactive aggression) were measured at multiple time points with a nine-month interval. This final chapter summarizes the main findings of this thesis, discusses the strengths and weaknesses of the studies, and provides suggestions for future directions.

MAIN OUTCOMES

The first aim of this thesis is to examine the level of self-conscious emotions in adolescents with ASD and adolescents with hearing loss, as compared to levels of self-conscious emotions in typically developing adolescents.

Theory of Mind
The first study of this thesis (**Chapter 2**) examined the understanding of three core ToM elements in young children with ASD (age range = one to six years old; $n = 63$): intentions, desires, and beliefs. Difficulty in understanding others' mental states is a core cognitive feature of ASD. Children with ASD already experience a substantial delay in ToM development at an early age (for reviews see Baron-Cohen, 2001; Kimhi, 2014). However, previous studies often focused on single elements of ToM, whereas the unique aspect of this study was that we studied three core elements of ToM simultaneously. Furthermore, we included children with ASD at a very young age. This

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was made possible by advances in the early identification of ASD (Kleinman et al., 2008). Studying different elements of ToM in very young children provides more insights in developmental timing of ToM abilities in children with ASD.

Children with ASD were less able to understand others' desires and beliefs compared to a group of typically developing controls. The outcomes regarding intention understanding were more diffuse: children with ASD were able to derive behavioural intentions but seemed to lack the social interest to share intentions. They were less inclined to react to the pointing gesture of an experimenter and, less often met the experimenters' non-verbal request to hand over a bottle cap as compared to the typically developing controls. Greater difficulty understanding the pointing gesture and non-verbal request in children with ASD could be explained by the highly social nature of these two latter tasks. Overall, this first study indicates that children with ASD experience more difficulties in understanding others' mental states. Yet understanding mental states is a basic requirement for the development of self-conscious emotions (Misailidi, 2018). The developmental delay in ToM remains into adolescence, where adolescents with ASD still show impairments in ToM abilities (e.g., Kimhi, 2014).

If social access is important for the development of ToM, a similar delay should be observed in ToM in children with hearing loss as observed in children with ASD. A previous study, using the same experimental design, showed that children with hearing loss also experience difficulties in their ToM development (Ketelaar, Rieffe, Wiefferink, & Frijns, 2012). This study included young children (i.e., one to six years old) with cochlear implants raised in hearing families. Children with hearing loss performed equally well on intention understanding tasks, but showed lower performance on desire and belief understanding as compared to hearing children (Ketelaar et al., 2012). Like in adolescents with ASD, these difficulties with ToM are still observed in adolescents with hearing loss (Gonzalez, Quintana, Barajas, & Linero, 2007; Hao, Su, & Chan, 2010; Lecciso, Levante, Baruffaldi, & Petrocchi, 2016).

When these outcomes regarding ToM skills of children with ASD and children with hearing loss are compared, one difference emerges. Children with ASD are less able to understand non-verbal gestures, while children with hearing loss do not seem to have any problem understanding the intentions of the experimenter compared to typically developing children. However, this can be explained by the known differences between the two studied groups. Parents of children with hearing loss may be more inclined to use non-verbal language due to their child's difficulty hearing speech compared to parents of hearing children. In addition, children with hearing loss do not tend to lack social interest in sharing intentions. Thus they are in a position to recruit non-verbal experience with intentions during the first years of life. Intention understanding skills usually emerge around the preverbal age of one (Behne, Carpenter,

Call, & Tomasello, 2005; Behne, Carpenter, & Tomasello, 2005; Camaioni, Perucchini, Bellagamba, & Colonnesi, 2004), and the development of intention understanding does not depend on verbal language comprehension (Akhtar & Gernsbacher, 2007). Therefore, it is not expected that the understanding of intentions is delayed in children with hearing loss. In contrast, children with ASD show less social interest from an early age (Chevallier, Kohls, Troiani, Brodkin, & Schultz, 2012). They are less inclined to attribute attention to social information, show less initiative in sharing attention, and respond less frequently to others' pointing gestures (Bruinsma, Koegel, & Koegel, 2004; Dawson et al., 2004; Mundy et al., 2007) Thus in children with ASD, their lack of social interest could be responsible for their delay in intention understanding, as well as desire and false-belief understanding (Chevallier et al., 2012). Taken together, the observed delays in ToM (i.e., desire and belief understanding) in both children with ASD and children with hearing loss suggest that input from the social world is indeed important for ToM development, regardless of the underlying cause for the reduced access.

Self-conscious emotions

Since ToM is delayed in children with ASD and children with hearing loss, we expected lower levels of self-conscious emotions. A good way to assess levels of shame and guilt is by using hypothetical scenarios that elicit shame or guilt and to ask participants to imagine being in this situation, and to report how ashamed or guilty they would feel. The Brief Shame and Guilt Questionnaire (BSGQ) uses this approach and consists of six shame-eliciting and six guilt-eliciting hypothetical scenarios.

To be able to map shame and guilt in adolescents with hearing loss, the third study of this thesis (**Chapter 4**) first assessed the suitability of the BSGQ for this group. Administering self-reports in adolescents with hearing loss can be unreliable due to a high incidence of language problems (Moeller & Tomblin, 2015; Tomblin et al., 2015). Difficult item formulation can therefore easily lead to misinterpretations. The BSGQ is a questionnaire especially designed for adolescents with language difficulties, given the short items and simple item formulation, and the possibility for viewing items in sign language (Novin & Rieffe, 2015). The third study indicated that the BSGQ can indeed be used to successfully measure shame and guilt in adolescents with hearing loss. The self-report questionnaire showed good reliabilities and construct validity in this group. In addition, the BSGQ showed measurement invariance, meaning that levels of shame and guilt in adolescents with hearing loss as measured by the BSGQ can be meaningfully compared to levels of shame and guilt in adolescents without hearing loss. Using the BSGQ, several studies in this thesis (**Chapter 3, 4, 5, and 6**) showed that adolescents with hearing loss and adolescents with ASD reported lower levels of shame and guilt compared to typically developing adolescents.

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The second main of this dissertation is to investigate the contribution of self-conscious emotions to the development of aggression.

The second and fourth study (**Chapter 3 and 5**) of this thesis examined the longitudinal contribution of shame and guilt to the development of bullying in typically developing adolescents. These studies showed that guilt was longitudinally associated with bullying, while shame was unrelated. The longitudinal association of guilt with bullying was bidirectional; lower levels of guilt contributed to higher levels of bullying over time, while higher levels of bullying also contributed to lower levels of guilt (see Figure 1). These findings suggest that individuals with low levels of guilt are more inclined to start bullying others compared to individuals with high levels of guilt, which is in line with previous studies showing that guilt inhibits transgressing behaviours (Roberts, Strayer, & Denham, 2014; Roos, Salmivalli, & Hodges, 2015; Stuewig, Tangney, Heigel, Harty, & McCloskey, 2010). But these findings also suggest that individuals who participate in bullying others become less prone to the experience of guilt. The more often one bullies, the lower the threshold becomes to bully again. This could be explained by the attempt of adolescents to condone their own immoral behaviours. Adolescents who display more bullying behaviours, are more inclined to engage in moral disengagement to deactivate the uncomfortable feeling of guilt (Mazzone, Camodeca, & Salmivalli, 2016; Thornberg, Pozzoli, Gini, & Jungert, 2015). Moral disengagement involves cognitive effort to disengage from your own immoral actions by, for example, minimizing one's role (e.g., "I bullied, but I was not the one who started it"), denying consequences (e.g., "we were just joking/teasing"), or blaming the victim (e.g., "it is his/her own fault"; Bandura, 1999). Individuals who use these strategies more frequently to escape their own feelings of guilt could therefore become less guilt-prone over time.

The fifth study of this thesis (**Chapter 6**) assessed the contribution of shame and guilt to the development of reactive and proactive aggression. Guilt played an inhibiting role in the development of aggression, but for proactive aggression only (see Figure 1). This is consistent with the finding that guilt also inhibits the development of bullying behaviours (**Chapter 3 and 5**). Adolescents who are prone to guilt will not quickly resort to purposeful aggressive behaviours or repeated aggressive actions towards a weaker individual (i.e., bullying). Presumably, adolescents who are prone to guilt will anticipate more negative outcomes following aggressive behaviour, such as harm for the victim and the negative feeling state associated with guilt.

Shame was unrelated to proactive aggression; however, this self-conscious emotion was uniquely associated with the development of reactive aggression (see Figure 1). Reactive aggression represents aggressive responses to a perceived threat or provocation, and is therefore associated with a high level of arousal (Tangney, Wagner, HillBarlow,
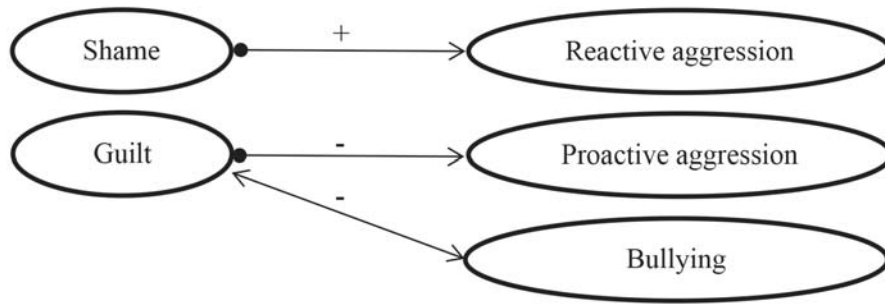
Figure 1. A graphic representation of the longitudinal associations in typically developing adolescents found in this thesis. This figure depicts the longitudinal associations of shame and guilt with three types of aggression: bullying, reactive aggression, and proactive aggression. Double-sided arrows represent bidirectional relations between variables over time and a dot at the end of a line indicates this direction has not been tested in this thesis. Plus signs indicate positive relations and minus signs indicate negative relations.

Marschall, & Gramzow, 1996). Thus, adolescents with higher levels of shame were more likely to use aggression to protect themselves or to retaliate. We suspect that shame-prone adolescents are more likely to interpret others' behaviour as threats for one's identity goals or as provocative.

Interestingly, adolescents with ASD and adolescents with hearing loss both reported lower levels of shame and guilt and similar levels of bullying, the longitudinal associations between these self-conscious emotions and bullying were similar to typically developing adolescents (**Chapter 3 and Chapter 5**; see Figure 1). This indicates that also in groups with less access to the social world, guilt has an inhibiting function in the development of bullying. In addition, for adolescents with hearing loss, the influence of shame and guilt on the development of proactive and reactive aggression was tested and did not result in differences compared to typically developing adolescents (**Chapter 6**). Thus also for adolescents with hearing loss, shame seems to encourage reactive aggression, while guilt discourages proactive aggression (see Figure 1).

Next to lower levels of shame and guilt, adolescents with hearing loss reported higher levels of proactive aggression, but similar levels of reactive aggression compared to typically developing adolescents (**Chapter 6**). The findings regarding levels of aggression are not surprising in light of the longitudinal associations. Lower levels of shame do not pose a risk for the development of reactive aggression. Only high levels of shame are associated with more reactive aggression. Based on the longitudinal associations, it is therefore not expected that adolescents with hearing loss would report elevated levels of reactive aggression. However, the lower levels of guilt do pose a risk for developing proactive aggression. Since lower levels of guilt are found in adolescents with hearing loss, it may not be surprising that higher levels of proactive aggression were reported by adolescents with hearing loss compared to typically developing adolescents.

GENERAL DISCUSSION

The link between shame and aggression

This thesis revealed that adolescents with higher levels of shame develop higher levels of reactive aggression, whereas shame was unrelated to bullying and proactive aggression. Previous studies were indecisive about the function of shame in the development of aggression. While some studies highlighted that shame prevents aggressive behaviours (Olthof, 2012; Roos, Salmivalli, & Hodges, 2011), other studies indicated that shame is related to higher levels of aggression (Stuewig et al., 2010). Longitudinal studies have failed to confirm any relationship between shame and aggression (Manning, 2005; Roos, Hodges, & Salmivalli, 2014). These contrary findings could be explained by differences in the particular operationalization of shame, the adopted measurement methods, and the strategies employed in analysis. The outcomes of this thesis should be interpreted with respect to these differences.

First, the dominant approach in psychology is to define shame as a strong negative emotion and to place great emphasis on the accompanying feeling of a deficient self (Tangney, 1998; Tangney, Burggraf, & Wagner, 1995). Researchers using this conceptualization tend to use instruments that highlight the negative affect associated with shame. For example, the widely used Test of Self-Conscious Affect for Children (TOSCA-C; Tangney, Wagner, Burggraf, Gramzow, & Fletcher, 1990) requests children to imagine being the protagonist of a hypothetical scenario in which the protagonist transgresses a social norm or standard. Subsequently, they are asked to indicate to what extent certain statements would apply to them. Responses to statements such as, "I would think: I'm terrible", are used as an indication for shame. These studies tend to relate shame to higher levels of aggression (Stuewig et al., 2010; Tangney, Stuewig, & Mashek, 2007). Whereas, researchers that do not (solely) focus on the negative characteristics of shame, tend to highlight the inhibiting role of shame in aggression (e.g., Olthof, 2012). In this thesis, we measured shame in reaction to hypothetical incompetent behaviour, putting emphasis on feelings of deficiency and inferiority. It is therefore not surprising that this thesis confirms previous studies that shame is related to higher levels of reactive aggression over time.

Second, although shame and guilt are clearly distinguishable, they are also highly correlated (Olthof, 2012; Roos et al., 2014; Tangney, Wagner, & Gramzow, 1992). It is therefore challenging to study the unique relations of shame and guilt with aggression. Some researchers attempt to study these unique relationships by controlling for the covariance between guilt and shame. Whether or not one controls for this covariance can strongly influence the drawn conclusions with regards to the relation with aggression. Because what is guilt-free shame? Filtering out the overlap with guilt could

put more emphasis on the unique and negative aspects of shame, such as the fear of being negatively evaluated, the urge to escape, and the focus on the defective self. For this reason, guilt-free shame might be more easily related to higher levels of aggression, whereas shame contaminated by guilt is more often found to be related to lower levels of aggression or unrelated to aggression (Novin & Rieffe, 2015; Rieffe, Camodeca, Pouw, Lange, & Stockmann, 2012; Roos et al., 2011). In this thesis the associations of shame with aggression are corrected for the covariance with guilt (**Chapters 3, 4, 5, and 7**). Future studies should unravel the influence of different measurement methods and controlling for covariance on the relationship between shame and aggression.

The link between guilt and aggression

The longitudinal studies in this thesis highlight that guilt can inhibit the tendency to bully others or to behave aggressively in order to obtain a certain goal (i.e., proactive aggression). The underlying process could be that guilt-prone individuals anticipate a negative emotional experience as a consequence of behaving aggressively, and therefore refrain from this norm-transgressing behavior (Tangney et al., 2007). These findings are consistent with previous cross-sectional studies (Onishi, Kawabata, Kurokawa, & Yoshida, 2012; Roberts et al., 2014; Roos et al., 2015). The innovative aspects of this thesis with regards to guilt compared to previous studies are: (1) the longitudinal design, as it has been shown that higher levels of guilt inhibit the development of bullying and proactive aggression over time, and (2) the conclusion that the inhibiting function of guilt is limited to non-impulsive types of aggression, such as bullying and proactive aggression, but that this inhibiting function does not extend to reactive aggression.

The social nature of shame and guilt

Shame and guilt are not only associated with antisocial behaviours such as aggression, but they also have an important social function (Tracy & Robins, 2004, 2007). As described in Chapter 1, self-conscious emotions serve as a social feedback system. The experience of shame and guilt both indicate that goals such as preserving social status and group acceptance are threatened. Therefore, the consequences of lower levels of shame and guilt in adolescents with ASD and hearing loss could extend beyond aggression.

Shame and guilt can both be experienced when one transgresses against another. This norm-transgressing behaviour could jeopardize social relationships. Guilt motivates an individual to make amends and to learn from previous mistakes. Shame motivates the urge to escape, manifested by avoiding eye-contact and a collapsed body posture. The expression of both shame and guilt signal to others that the perpetrator

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is aware of the mistake and the harm done (Tracy & Robins, 2004, 2007). In addition, the expression of these self-conscious emotions implicates that the perpetrator will probably not repeat this harmful behaviour in the future. Therefore, others are more willing to forgive or accept someone who displays shame and/or guilt (Giner-Sorolla, 2012). In other words, both shame and guilt are crucial in restoring relationships and achieving social acceptance. Therefore, lower levels of these self-conscious emotions could lead to problems maintaining social relationships and social acceptance. Both adolescents with ASD and adolescents with hearing loss have more difficulty in maintaining positive friendships and are more often rejected by peers (Kasari, Locke, Gulsrud, & Rotheram-Fuller, 2011; Wolters, Knoors, Cillessen, & Verhoeven, 2011). Future studies should examine the consequences of lower levels of shame and guilt for social functioning.

Considerations and directions for future research

This thesis raises several issues that need to be considered. First, a strong assumption is made in this thesis that ToM is a necessary requirement for the development of self-conscious emotions. Given that other studies have found lower levels of ToM in adolescents with ASD and adolescents with hearing loss, we inferred that these groups would be at risk for delay in the development of shame and guilt. However, while the theoretical foundation for a connection between ToM and self-conscious emotions is strong, no experimental studies have yet examined this claim. Only one recent study has directly assessed the link between ToM and guilt (Misailidi, 2018). This study found that a higher performance on ToM tasks was positively related to the ability to define guilt, and to the accuracy with which a retrospective guilt experience was reported. This suggests that ToM development should be encouraged from an early age, especially in adolescents with lower levels of self-conscious emotions. Future studies are needed to examine whether ToM interventions are successful in promoting the development of self-conscious emotions.

Second, given the lower levels of reported guilt in adolescents with ASD and adolescents with hearing loss, it is remarkable that they did not report elevated levels of aggression, except for higher levels of proactive aggression in adolescents with hearing loss. In addition, it is especially remarkable that adolescents with ASD and adolescents with hearing loss do not engage in more bullying, despite reporting higher levels of victimization. Note that adolescents in a community population (i.e. without hearing loss or ASD) who are more often victimized, tend to bully more often themselves. These findings suggest that adolescents with ASD and hearing loss seem well aware of societal rules, norms and values regarding socially accepted behaviours, such as levels of aggression within the social context. In other words, regardless of their

challenges with social access, also these adolescents seem to develop in a way as to contribute positively and constructively to their social environment, although more research is obviously needed to further strengthen this claim. Yet, lower levels of guilt cannot explain why these adolescents do not engage in more aggressive behaviours. The outcomes suggest that other mechanisms are in place in inhibiting aggression in these groups with less social access. Future studies are recommended to unravel which other factors are important in the prevention of aggression in groups with less social access.

A third point to consider is the way in which the role of social access is assessed in this thesis. A unique approach is employed; the relation between self-conscious emotions and adolescents aggression is examined in two groups with less social access, and compared with typically developing adolescents. Instead of including intrapersonal factors (e.g., autism symptom severity, the degree of hearing loss, communication quality, etc.), this approach enables to capture the constant day-to-day experience of diminished access to the social world from an early age. Based on this approach, it can be concluded that social access is important for the development of self-conscious emotions. This is why we should strive for a society in which all children are socially included. Research is often focused on how individuals with ASD or hearing loss can improve their social participation. But is it not everyone's responsibility to make the social world accessible for every child?

CONCLUSIONS

This thesis aimed to unravel the longitudinal contributions of shame and guilt on the development of adolescent aggression. The studies in this thesis have demonstrated that shame is a risk factor for the development of reactive aggression, and that guilt is an inhibiting force on the development of bullying and proactive aggression. Thus, adolescents with lower levels of guilt are at risk for developing bullying and proactive aggression.

Even though lower levels of self-conscious emotions were reported by adolescents whose access to the social world was diminished by ASD or hearing loss, the longitudinal relations in these groups between shame, guilt and aggression were similar to those in typically developing adolescents. Importantly, this indicates that guilt also functions as an important inhibitor for aggression in adolescents with less access to the social world. However, lower levels of self-conscious emotions in the two groups with less access to the social world do demonstrate that the development of self-conscious emotions depends on sufficient social input. In addition, more factors seem

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into play for adolescents for which access to their social environment might come less easy, since they do not show heightened levels of aggression (except for proactive aggression in adolescents with hearing loss), despite lower (self-reported) levels of these self-conscious emotions.

Hopefully, this work will inspire other researchers to unravel which and to what extent social information is crucial for the development of self-conscious emotions, because this thesis has shown that guilt is an indispensable aspect in promoting a harmonious society.

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Chapter 8

Nederlandse Samenvatting
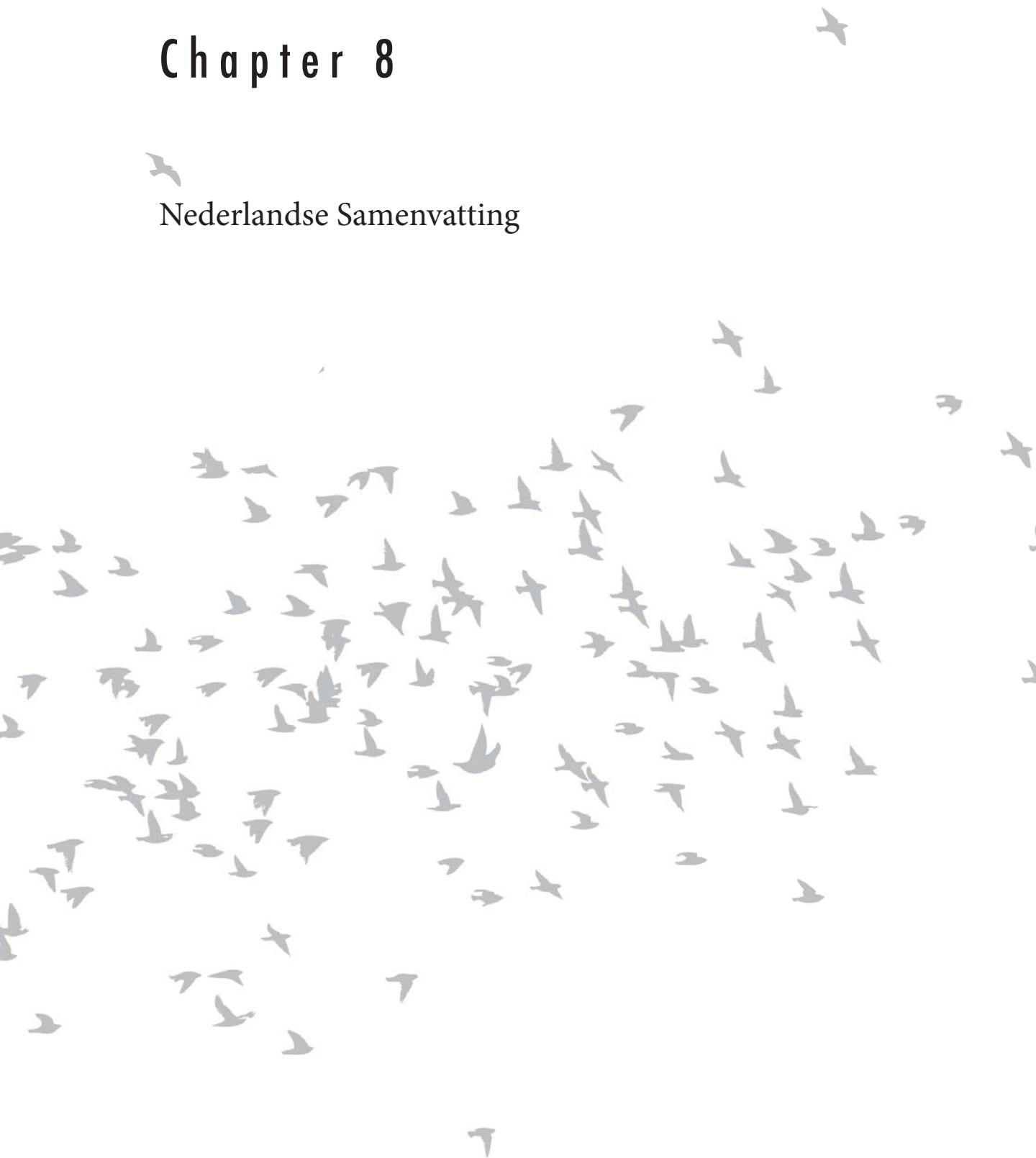
REFLECTIE, (RE)ACTIE, EN INTERACTIE
De rollen van schaamte, schuld en sociale toegang in de ontwikkeling van agressie in de adolescentie

Zelfbewuste emoties treden op wanneer we ons eigen gedrag evalueren of als we bedenken hoe anderen ons waarnemen. Deze emoties zijn belangrijk voor het bewerkstelligen van een harmonieuze samenleving; een samenleving waarin het gedrag van mensen wordt gevormd door de heersende normen en waarden. Als mensen zich gedragen op een manier die ongepast is binnen de sociale context kan dit negatieve zelfbewuste emoties, zoals schaamte en schuld, ten gevolge hebben. Het negatieve gevoel wat hiermee gepaard gaat, demotiveert mensen om dit ongepaste sociale gedrag in de toekomst (opnieuw) te vertonen. Met andere woorden, schaamte en schuld worden beschouwd als de emotionele remmen ter voorkoming van grensoverschrijdend gedrag (Beer et al., 2003; Tangney, Stuewig, & Mashek, 2007).

Eerdere studies hebben schaamte en schuld dan ook gelinkt aan sociaal onaangepast gedrag zoals agressie (Roberts, Strayer, & Denham, 2014; Stuewig, Tangney, Heigel, Harty, & McCloskey, 2010; Tangney et al., 2007). Maar over de bijdrage van deze emoties aan de ontwikkeling van agressie over tijd en over de richting van deze relatie is nog weinig bekend. Er kunnen dus nog geen (sterke) uitspraken worden gedaan of zelfbewuste emoties daadwerkelijk bijdragen aan veranderingen in agressie over tijd. In dit proefschrift zal de invloed van schaamte en schuld op de ontwikkeling van agressie worden onderzocht in een levensfase die gekenmerkt wordt door grote sociale, emotionele en cognitieve veranderingen; de adolescentie (Brown, 2014).

De invloed van sociale toegang
Emoties, waaronder zelfbewuste emoties, worden geleerd in een sociale omgeving. Kinderen leren over emoties door te observeren en door de communicatie met en van anderen (Eisenberg, Cumberland, & Spinrad, 1998). Als dit leerproces zo afhankelijk is van deze sociale omgeving en van communicatie, betekent dit dat kinderen die minder toegang hebben tot de sociale wereld waarschijnlijk meer moeilijkheden zullen ervaren in het ontwikkelen van zelfbewuste emoties. In hoeverre interfereert verminderde toegang tot de sociale wereld met de ontwikkeling van zelfbewuste emoties? En wat betekent dit voor de relatie van zelfbewuste emoties met agressie?

Om antwoord te krijgen op deze vragen is in dit proefschrift de ontwikkeling van zelfbewuste emoties onderzocht in twee onafhankelijke groepen met verminderde toegang tot de sociale wereld: adolescenten met een autisme spectrum stoornis en adolescenten met gehoorverlies. Een autisme spectrum stoornis (ASS) is een ontwikkelingsstoornis die gekenmerkt wordt door problemen in sociale en

communicatie vaardigheden (DSM 5; American Psychiatric Association, 2013). Individuen met ASS worstelen veelal vanaf een jonge leeftijd met sociale interactie, en dit gaat ten koste van de kwaliteit en kwantiteit van hun sociale ervaringen (Beurkens, Hobson, & Hobson, 2013). Ook kinderen met gehoorverlies zijn beperkt in hun toegang tot de sociale wereld omdat zij minder toegang hebben tot auditieve input. Daarnaast wordt het merendeel van kinderen met gehoorverlies grootgebracht door horende ouders en hebben zij horende broertjes en zusjes (die geen gebarentaal spreken op het niveau van hun moedertaal), waardoor op jonge leeftijd al beperkingen in de communicatie kunnen ontstaan (Ambrose, Walker, Unflat-Berry, Oleson, & Moeller, 2015; Mitchell & Karchmer, 2004).

In dit proefschrift stonden twee hoofddoelen centraal. Het **eerste hoofddoel** was om de invloed van sociale toegang op de ontwikkeling van zelfbewuste emoties (schaamte en schuld) te onderzoeken. Dit werd onderzocht door de niveaus van zelfbewuste emoties in kaart te brengen voor twee groepen met verminderde sociale toegang, namelijk adolescenten met ASS en adolescenten met gehoorverlies. De niveaus van zelfbewuste emoties van adolescenten met ASS en gehoorverlies werden vergeleken met de niveaus van adolescenten uit de algemene populatie. Deze groep adolescenten heeft geen ASS of gehoorverlies. Het **tweede hoofddoel** van dit proefschrift was om de relatie tussen zelfbewuste emoties en de ontwikkeling van agressie in kaart te brengen voor deze drie groepen adolescenten: (1) adolescenten uit de algemene populatie (2) adolescenten met ASS, en (3) adolescenten met gehoorverlies. Om deze longitudinale relaties te kunnen onderzoeken, werden zelfbewuste emoties (schaamte en schuld) en verschillende vormen van agressie gemeten op twee/drie tijdsmomenten met een tijdsinterval van negen maanden.

Overwegingen met betrekking tot terminologie in dit proefschrift

In de afgelopen decennia zijn er verschillende richtlijnen geweest hoe het best gerefereerd kan worden aan individuen met ASS en gehoorverlies. Hierin zijn twee stromingen te onderscheiden. In beide stromingen pleiten voorstanders ervoor om de voornaamste identiteit te benadrukken. De eerste stroming, veelal leden van de autisme gemeenschap en dove gemeenschap, zien ASS/gehoorverlies als een inherent onderdeel van hun identiteit. Zij prefereren daarom om "autistisch/doof" vooraan te plaatsen, zoals in "autistische adolescenten" en "dove adolescenten". De tweede stroming, veelal ouders en professionals, prefereren taalgebruik waarbij de persoon eerst wordt genoemd, zoals in "adolescenten met autisme" en "adolescenten met gehoorverlies". Zij zien autisme en/of gehoorverlies niet als hetgeen een individu met autisme/gehoorverlies identificeert en vrezen dat termen zoals "autistische/dove jongen" een stigmatiserende werking hebben. Echter, deze opvattingen wisselen door de tijd heen, en daarmee ook de geprefereerde terminologie.

In dit proefschrift refereren we aan adolescenten met autisme en adolescenten met gehoorverlies, omdat dit ten tijde van publiceren van de afzonderlijke hoofdstukken in de leidende wetenschappelijke tijdschriften gebruikelijk was en editors wilden dat we dit taalgebruik zouden hanteren. Echter, op het moment dat dit proefschrift naar de drukker gaat, is hierin al weer verandering gekomen, en vragen editors om te refereren naar "autistische jongeren". We zijn ons bewust dat verschillen in terminologie een grote impact kunnen hebben, en willen hiermee zo respectvol mogelijk omgaan. Wij hopen dat deze uitleg hieraan bijdraagt.

Daarnaast refereren we aan de groep van adolescenten zonder ASS en zonder gehoorverlies in deze samenvatting als "adolescenten uit de algemene populatie". Hier wordt enkel mee bedoeld dat deze adolescenten geen ASS of gehoorverlies hebben, en dat deze adolescenten zijn geselecteerd uit de algemene populatie. Hiermee wordt uiteraard niet bedoeld dat individuen met autisme en gehoorvlies niet tot de algemene populatie behoren.

HOOFDDOEL 1

Het onderzoeken van niveaus van zelfbewuste emoties in adolescenten met ASS en adolescenten met gehoorverlies, en in vergelijking met niveaus van adolescenten uit de algemene populatie

Theory of Mind
In **hoofdstuk 2** werd een belangrijke voorwaarde onderzocht voor het ontwikkelen van zelfbewuste emoties, namelijk *Theory of Mind* (ToM). Om zelfbewuste emoties te kunnen ervaren moeten kinderen zich eerst realiseren dat anderen hun gedrag evalueren en dat hun gedrag consequenties heeft voor anderen. Bij schaamte ervaart men namelijk (de angst) dat anderen ons negatief beoordelen, terwijl men zich bij schuld verantwoordelijk voelt voor het negatieve gevolg van ons gedrag voor een ander. Het aannemen van andermans perspectief, ook wel ToM genoemd, is dus een belangrijke voorwaarde voor het ervaren van zelfbewuste emoties. In hoofdstuk 2 werden de ToM vaardigheden onderzocht van jonge kinderen met ASS (1-6 jaar oud). Dat kinderen met ASS een vertraagde ToM ontwikkeling hebben is welbekend in de literatuur (Baron-Cohen, 2001; Kimhi 2014), maar waar eerder onderzoek zich heeft gefocust op één specifiek element van ToM, namelijk het begrip van andermans overtuigingen, werden in dit hoofdstuk drie kernelementen van ToM onderzocht bij kinderen met ASS. De drie kernelementen van ToM zijn het begrip van andermans intenties, verlangens en overtuigingen.

De uitkomsten met betrekking tot intentiebegrip waren uiteenlopend. Nadat de proefleider er tot driemaal toe niet in slaagde om een actie te voltooien, bijvoorbeeld het opstapelen van twee bekers, slaagden kinderen met ASS er even vaak in om deze actie te voltooien als kinderen zonder ASS. Hieruit blijkt dat kinderen met ASS even goed waren in het afleiden van een intentie uit gedrag. Kinderen met ASS reageerde echter minder op wijsgebaren en op het non-verbale verzoek om iets aan te geven. Daarnaast bleek uit deze studie dat kinderen met ASS meer moeite hadden om de verlangens en de overtuigingen van anderen te begrijpen dan kinderen zonder ASS. De uitkomsten van hoofdstuk 2 bevestigen nogmaals dat kinderen met ASS meer moeite hebben met het ontwikkelen van ToM, en dat dit geldt voor alle drie de kernelementen.

Een eerdere studie met hetzelfde design heeft aangetoond dat kinderen met gehoorverlies ook problemen ervaren in de ontwikkeling van ToM (Ketelaar, Rieffe, Wiefferink, & Frijns, 2012). Deze studie includeerde jonge kinderen tussen 1- en 6 jaar oud, die opgroeiden in horende families. De kinderen met gehoorverlies hadden geen moeite om intenties te begrijpen. Ze hadden echter wel meer moeite met het begrijpen van verlangens en overtuigingen van anderen dan hun horende leeftijdsgenoten. Omdat ToM een voorwaarde is voor het ervaren van zelfbewuste emoties werden lagere niveaus van zelfbewuste emoties verwacht voor adolescenten met ASS en adolescenten met gehoorverlies in vergelijking met adolescenten uit de algemene populatie.

Zelfbewuste emoties in adolescenten met ASS/gehoorverlies

De gevoeligheid om schaamte of schuld te ervaren wordt bij adolescenten veelal gemeten met behulp van zelfrapportage vragenlijsten. Deze vragenlijsten bestaan vaak uit hypothetische scenario's die zijn ontworpen om deze emoties op te wekken. Adolescenten wordt gevraagd deze scenario's te lezen en vervolgens te rapporteren in hoeverre ze zich zouden schamen of hoe schuldig ze zich zouden voelen. In dit proefschrift werd ook een zelfrapportage vragenlijst gebruikt om schaamte en schuld te meten, namelijk *The Brief Shame and Guilt Questionnaire* (BSGQ; Novin & Rieffe, 2015). Deze vragenlijst bestond uit zes scenario's die zijn ontworpen om schaamte te meten en zes scenario's om schuld te meten. Een voorbeeld van een scenario om schaamte te meten is: "Je haalt een onvoldoende op school". Een voorbeeld om schuld te meten is: "Je klasgenoot heeft lang gewerkt aan schilderij. Jij let niet op en stoot tegen glas met water en alles gaat over schilderij". Vervolgens konden adolescenten hun niveaus van schaamte en schuld aangeven op een driepuntschaal (1 = niet, 2 = een beetje, 2 = veel).

Het afnemen van zelfrapportage vragenlijsten bij adolescenten met gehoorverlies is snel onbetrouwbaar omdat taalproblemen vaker voorkomen bij adolescenten met

gehoorverlies (Moeller & Tomblin, 2015;Tomblin et al., 2015). Het gebruiken van lastige formuleringen of moeilijke woorden kan daarom snel tot misinterpretaties leiden. De BSGQ werd speciaal ontworpen voor adolescenten met taalmoeilijkheden. Het benodigde taalniveau voor het lezen van de scenario's is zo laag mogelijk gehouden, en daarnaast is er de mogelijkheid om de scenario's in Nederlandse Gebarentaal te bekijken (deze vertaling van Nederlands naar Nederlandse Gebarentaal werd gedaan door Maartje Kouwenberg).

In **hoofdstuk 4** van dit proefschrift werd de geschiktheid van deze vragenlijst voor adolescenten met gehoorverlies onderzocht. Deze studie toonde aan dat de BSGQ inderdaad geschikt is voor het meten van schaamte en schuld bij adolescenten met gehoorverlies. De vragenlijst had een goed niveau van interne consistentie, en factor analyses differentieerden goed tussen de schalen voor schaamte en schuld. Ook waren er geen verschillen in de werking van de vragenlijst tussen adolescenten met gehoorverlies en adolescenten uit de algemene populatie. Dit betekent dat niveaus van schaamte en schuld zoals gemeten met de BSGQ bij adolescenten met gehoorverlies betrouwbaar vergeleken kunnen worden met die van adolescenten uit de algemene populatie.

De BSGQ zelf-rapportage is in verschillende hoofdstukken (**3, 4, 5, en 6**) afgenomen bij adolescenten met ASS en adolescenten met gehoorverlies. Uit de resultaten van deze studies bleek dat zowel adolescenten met ASS als adolescenten met gehoorverlies lagere niveaus van schaamte en schuld rapporteerden in vergelijking met adolescenten uit de algemene populatie.

HOOFDDOEL 2

Het onderzoeken van de relatie tussen zelfbewuste emoties en de ontwikkeling van agressie

Hoofdstuk 3 en hoofdstuk 5 van dit proefschrift onderzochten de voorspellende waarde van schaamte en schuld in de ontwikkeling van pestgedrag in een groep van adolescenten uit de algemene populatie. Deze studies toonden aan dat schuld longitudinaal geassocieerd was met pestgedrag, terwijl schaamte niet gerelateerd was aan pestgedrag. De longitudinale relatie tussen schuld en pesten werkte twee kanten op; lagere niveaus van schuld droegen bij aan hogere niveaus van pesten over tijd, terwijl hogere niveaus van pesten ook bijdroegen aan lagere niveaus van schuld (zie Figuur 1). Deze bevindingen suggereren dat adolescenten met lagere niveaus van schuld eerder geneigd zijn om anderen te pesten in vergelijking met adolescenten met hogere
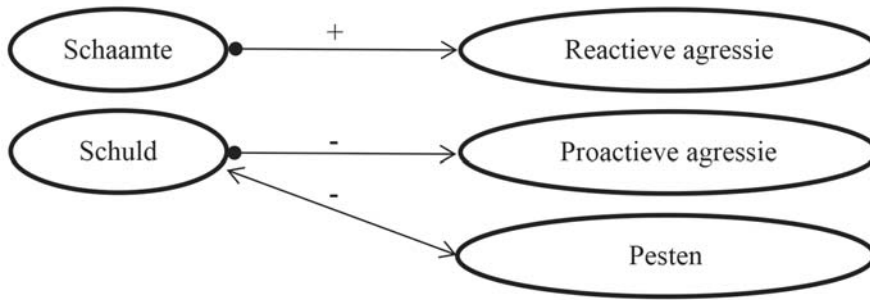
Figuur 1. Een visuele weergave van de longitudinale relaties die zijn gevonden in dit proefschrift voor adolescenten uit de algemene populatie. Tweezijdige pijlen geven relaties weer die twee kanten op werken. Een stip, in plaats van een pijl, aan het einde van een lijn betekent dat de richting van deze relatie niet is onderzocht in dit proefschrift. Plustekens illustreren een positieve relatie en mintekens illustreren een negatieve relatie.

niveaus van schuld. Deze bevindingen zijn consistent met eerdere studies die aantonen dat schuld antisociaal en grensoverschrijdend gedrag demotiveert (Roberts et al., 2014; Stuewig et al., 2010). Maar daarnaast suggereren deze bevindingen ook dat vaker pesten tot verminderde schuldgevoeligheid leidt. Het lijkt er op dat hoe vaker adolescenten pesten, hoe lager de drempel wordt om opnieuw pestgedrag te vertonen.

In **hoofdstuk 6** werd de voorspellende waarde van schaamte en schuld onderzocht in de ontwikkeling van reactieve agressie en proactieve agressie bij adolescenten uit de algemene populatie. Reactieve agressie is vaak een emotionele reactie op een waargenomen provocatie ("*Ik sloeg hem, omdat hij mij uitschold*"), terwijl proactieve agressie een weloverwogen vorm van agressie is die vaak wordt gemotiveerd door het verlangen om een bepaald doel te bereiken ("*Ik sloeg hem, omdat ik de baas wil zijn*"; Cima, Raine, Meesters, & Popma, 2013). Ook uit de resultaten van hoofdstuk 6 bleek dat schuld een demotiverende rol heeft in de ontwikkeling van agressie, maar alleen voor proactieve agressie en niet voor reactieve agressie (zie Figuur 1). Met andere woorden, adolescenten met hogere niveaus van schuld zullen minder snel agressief gedrag ontwikkelen gemotiveerd door het verlangen om bepaalde doelen te bereiken in vergelijking met adolescenten met lage niveaus van schuld.

Hoewel schaamte niet gerelateerd was aan proactieve agressie, was schaamte wel gerelateerd aan de ontwikkeling van reactieve agressie (zie Figuur 1). Adolescenten met hogere niveaus van schaamte waren eerder geneigd om agressief gedrag te vertonen in reactie op provocatie. Deze bevindingen doen vermoeden dat adolescenten die gevoelig zijn om schaamte te ervaren, andermans gedrag eerder interpreteren als provocatie of als een bedreiging voor hun zelfbeeld.

8

Adolescenten met ASS en adolescenten met gehoorverlies

Hoewel adolescenten met ASS en adolescenten met gehoorverlies lagere niveaus van schaamte en schuld en gelijke niveaus van pestgedrag rapporteerden, waren de longitudinale relaties tussen zelfbewuste emoties en pesten gelijk aan die van adolescenten uit de algemene populatie (**hoofdstuk 3 en hoofdstuk 5;** zie Figuur 1). Dit betekent dat schuld ook in adolescenten met verminderde sociale toegang een demotiverende invloed heeft op de ontwikkeling van pestgedrag.

In adolescenten met gehoorverlies, werd ook de invloed van schaamte en schuld op de ontwikkeling van reactieve en proactieve agressie onderzocht in **hoofdstuk 6**. Ook deze relaties waren niet verschillend in vergelijking met adolescenten uit de algemene populatie, dus schaamte droeg bij aan hogere niveaus van reactieve agressie, terwijl schuld bijdroeg aan lagere niveaus van proactieve agressie (zie Figuur 1).

In hoofdstuk 7 werden de bevindingen, net zoals hierboven, overzichtelijk op een rijtje gezet en bediscussieerd. Op basis van dit proefschrift kan worden geconcludeerd dat sociale toegang een cruciale rol speelt in de ontwikkeling van schaamte en schuld, omdat lagere niveaus van deze zelfbewuste emoties zijn aangetoond in zowel adolescenten met ASS en adolescenten met gehoorverlies. Daarnaast toont dit proefschrift aan dat schaamte een risicofactor is voor de ontwikkeling van reactieve agressie, terwijl schuld een belangrijke beschermende factor is in de ontwikkeling van pestgedrag en proactieve agressie. Deze relaties waren ook van kracht in adolescenten met verminderde toegang tot de sociale wereld.

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8

Appendices

Supplementary materials

List of publications

Curriculum Vitae

SUPPLEMENTARY MATERIALS CHAPTER 3

Detailed description of the samples and procedures

For recruiting the boys without autism, we first contacted the schools to participate and then handed out information and consent letters. Testing these boys in their school allowed us to test multiple participants in one day, rather than going to their home to test them individually.

The boys with autism where recruited through a Center for Autism, a facility specialized in diagnosing and treating children with autism, and two schools for children with autism. We sent information and consent letters to the parents. The boys who were recruited through the Center for Autism were tested either at their home or at the facility (depending on what the parents preferred). We had no contact with their school. The boys who were recruited through their schools were tested at their school.

We had two explicit inclusion criteria that applied for both groups: a) IQ > 80 and b) no additional diagnoses based on DSM IV. IQ scores were based on the means of the norm scores of two nonverbal subscales of the Wechsler Intelligence Scale (WISC; Kort et al., 2002; Wechsler, 1991): Block Design (copying small geometric designs consisting of four or nine plastic cubes) and Picture Arrangement (sequencing cartoon pictures to make sensible stories). These tests were administered and interpreted by qualified and experienced psychologists. Additionally, we excluded participants with additional diagnoses. For the autistic sample, this information was taken from their file. For the non-autistic sample, we asked parents if their child had any diagnosis.

By using these criteria our sample was relatively homogeneous. A more heterogeneous sample could diffuse the interpretation of the results. Yet, given the high comorbidity rates of autism with other disorders (e.g., anxiety disorders, conduct disorders, ADHD), future research should examine the moderating effects of these disorders in the relationships we found.

Detailed description of the statistical analyses

In order to examine the contribution of emotions on Bullying Others and Victimization and vice versa, General Linear Model (GLM) analyses with clustered bootstrapping were performed. A GLM with clustered bootstrapping is a simple linear regression that takes the dependency between observations of the same participant into account. Thus, GLM analyses allow us to parse out the unique contribution of the predictor variables on the development of the outcome variable, beyond any effect shared with another predictor (Gordon, 2010). An advantage of this method is that few distributional assumptions are made, however, large uncentered variables and missing data might bias results (Graham and Hofer, 2000; Nugent et al., 2012). Therefore, age was centered

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on the youngest participant (i.e., 109 months). Little MCAR test ($p < .01$) suggests that our missing data (see Table S3) is not missing completely at random. Since there was no indication that our missing data is missing non at random, missing at random was assumed. This type of missing data is best handled with multiple imputation (see Azur et al., 2011 for more information). We created 10 imputation sets to fill in the missing mean scores (Graham, 2009). Imputations were based on all variables in this study: bullying, victimization, guilt, shame, anger, fear and personal characteristics (i.e., Age at Time 1, Time 2, and Time 3, Group, IQ, Language, and SES). Analyses were performed on the imputed data and pooled results are reported.

To be able to differentiate between and within effects, we computed a mean score and change score per participant. The mean score represents the mean value for a variable for the three measurement occasions. The change score represents the score on either Time 1, Time 2 or Time 3 minus the mean score of the participant. A mean score in a GLM analysis assesses whether differences between participants in a predictor variable predicts a change in the outcome variable, while a change score assesses whether a change in the predictor variable predicts a change in the outcome variable.

To examine the contribution of emotions on Bullying Others and Victimization and vice versa, we first fitted basic models for each outcome measure. In these basic models Group (0 = no autism, 1 = autism) was inserted to examine group differences. Age, IQ, Language and Victimization were corrected for (see Table S4 for all basic models). Additionally, to assess differences in relations between boys with and without autism, interactions with Group were added to each basic model (e.g., Mean Anger x Group and Change Anger x Group). Only significant interactions were retained in the final model (more information about this procedure can be found in Broekhof, Bos, Camodeca, & Rieffe, 2018). Missing value analysis and multiple imputation were performed in SPSS version 24.0. For GLM analyses R version 3.3.0 was used in combination with the *Clusbootglm* function (de Rooij, 2013). The figures were made in R using the ggplot2 function. The figures represent the single relation between an emotion and Bullying Others/Vicimization, which do not control for other variables that were originally included in the final model.

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Table S1. Characteristics of participants.

	Autism	no Autism	Group differences
No. of participants	73	96	
Mean age in years at Time 1 (*SD*)	11.8 (1.35)	11.5 (1.38)	$t(167) = -1.28, p = .204$
Mean age in years at Time 2 (*SD*)	12.5 (1.39)	12.2 (1.38)	$t(149) = -1.38, p = .169$
Mean age in years at Time 3 (*SD*)	13.3 (1.42)	13.0 (1.41)	$t(128) = -1.28, p = .204$
IQ score*	11.44	10.78	$t(154) = -1.50, p = .136$
Language*	9.08[a]	10.07[b]	$t(151) = 2.47, p = .015$
Social economic status[†]	3.16	3.25	$t(130) = .89, p = .377$

Note. Autism = boys with autism; no Autism = boys without autism.
Character superscripts indicate differences between groups at $p < .05$, as evidenced by independent t-tests on the raw data.
* For IQ and language, age-corrected norm scores are presented. The grand population mean is set to 10.
[†] Based on parental education: (1) no/primary education, (2) lower general secondary education, (3) higher general secondary education, (4) college/university.

Table S2. Psychometric properties, mean scores and group differences of Bullying Others/Victimization and Emotions at Time 1, Time 2, and Time 3 as a function of group.

	No. items	Cronbach's α Autism	no Autism	Mean scores (SD) Autism	no Autism	Group differences independent t-tests
Time 1						
Bullying	9	.81	.79	1.60 (.38)	1.60 (.35)	$t(161) = -.28, p = .778$
Victimization	10	.81	.77	1.61[a] (.38)	1.42[b] (.31)	$t(163) = -3.53, p = .001$
Anger	4	.91	.81	1.61 (.59)	1.49 (.46)	$t(162) = -1.29, p = .199$
Fear	4	.69	.70	1.52[a] (.44)	1.22[b] (.34)	$t(162) = -4.90, p < .001$
Guilt	6	.80	.67	2.03[b] (.53)	2.22[a] (.42)	$t(161) = 2.80, p = .006$
Shame	6	.81	.74	1.97[b] (.54)	2.19[a] (.49)	$t(161) = 2.91, p = .004$
Time 2						
Bullying	9	.86	.78	1.58 (.44)	1.64 (.35)	$t(144) = .75, p = .455$
Victimization	10	.81	.77	1.52 (.38)	1.42 (.30)	$t(149) = -1.78, p = .077$
Anger	4	.92	.86	1.54 (.59)	1.54 (.49)	$t(147) = -.22, p = .823$
Fear	4	.86	.74	1.39 (.52)	1.30 (.38)	$t(147) = -1.06, p = .290$
Guilt	6	.78	.69	2.11[b] (.49)	2.28[a] (.41)	$t(143) = 2.21, p = .029$
Shame	6	.79	.70	2.07[b] (.54)	2.31[a] (.44)	$t(143) = 3.33, p = .001$
Time 3						
Bullying	9	.83	.77	1.50 (.38)	1.46 (.32)	$t(125) = -1.04, p = .302$
Victimization	10	.75	.74	1.45 (.32)	1.38 (.30)	$t(125) = -1.55, p = .124$
Anger	4	.94	.86	1.63 (.62)	1.52 (.46)	$t(126) = -1.43, p = .155$
Fear	4	.88	.79	1.43 (.48)	1.38 (.42)	$t(126) = -.83, p = .406$
Guilt	6	.82	.61	2.27 (.49)	2.30 (.36)	$t(127) = .30, p = .762$
Shame	6	.78	.67	1.92[b] (.53)	2.27[a] (.42)	$t(127) = 4.01, p < .001$

Note. Autism = boys with autism; no Autism = boys without autism.
Cronbach's alphas are based on the raw data, since missing scale means were imputed rather than item values.
Character superscripts indicate differences between groups at $p < .05$ as evidenced by independent t-tests on the raw data.

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Table S3. An overview of amount of missing data

	Participants		Missing	
	Autism *n* = 73	no Autism *n* = 96	Count	Percentage
Language	68	85	16	9.5
IQ	71	85	13	7.7
Time 1	*n* = 73	*n* = 96		
Age	73	96	0	0
Bullying Others	67	96	6	3.6
Victimization	69	96	4	2.4
Anger	68	96	5	3.0
Fear	68	96	5	3.0
Guilt	67	96	6	3.6
Shame	67	96	6	3.6
Time 2	*n* = 67	*n* = 84		
Age	67	84	18	10.7
Bullying Others	64	82	23	13.6
Victimization	67	84	18	10.7
Anger	65	84	20	11.8
Fear	65	84	20	11.8
Guilt	64	81	24	14.2
Shame	64	81	24	14.2
Time 3	*n* = 62	*n* = 68		
Age	62	68	39	23.1
Bullying Others	60	67	42	24.9
Victimization	60	67	42	24.9
Anger	60	68	41	24.3
Fear	60	68	41	24.3
Guilt	61	68	40	23.7
Shame	61	68	40	23.7

Note. Autism = boys with autism; no Autism = boys without autism.

Table S4. Basic models of the GLM analyses with clustered bootstrapping for each separate outcome variable

Dependent variable	Predictors
Bullying Others	= Age + Group + Language + IQ + Victimization (M & C) + Anger (M & C) + Guilt (M & C) + Shame (M & C).
Victimization	= Age + Group + Language + IQ + Bullying Others (M & C) + Anger (M & C) + Fear (M & C) + Shame (M & C).
Anger	= Age + Group + Language + IQ + Bullying Others (M & C) + Victimization (M & C).
Fear	= Age + Group + Language + IQ + Victimization (M & C).
Guilt	= Age + Group + Language + IQ + Bullying Others (M & C).
Shame	= Age + Group + Language + IQ + Bullying Others (M & C) + Victimization (M & C).

Note. M = Mean score; C = Change score.

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SUPPLEMENTARY MATERIALS CHAPTER 5

Table S1. An overview of amount of missing data and outliers.

	Participants		Missing			
	DHH	H	DHH Count	%	H Count	%
Time 1	$n = 80$	$n = 227$				
Gender	0	0	0	0	0	0
IQ	77	199	3	3.8	28	12.3
Language	55	199	25	31.3	28	12.3
Parental education level	68	165	12	15.0	62	27.3
Age	80	227	0	0	0	0
Bullying	53	227	27	33.8	0	0
Victimization	80	227	0	0	0	0
Anger	80	227	0	0	0	0
Fear	80	227	0	0	0	0
Guilt	78	227	2	2.5	0	0
Shame	78	227	2	2.5	0	0
Time 2	n = 78	n = 198	2	2.5	29	12.8
Age	78	198	2	2.5	29	12.8
Bullying	75	195	5	6.3	32	14.1
Victimization	77	198	3	3.8	29	12.8
Anger	78	197	2	2.5	30	13.1
Fear	78	197	2	2.5	30	13.1
Guilt	74	194	6	7.5	33	14.5
Shame	74	194	6	7.5	33	14.5

Note. DHH = Deaf and Hard of Hearing, H = hearing.

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Table S2. Participant characteristics per DHH group regarding Type of Education by Type of hearing device.

	(1) Hearing Device		(2) Cochlear Implant	
	Mainstream education	Special education	Mainstream education	Special education
No. of participants	32	21	16	11
Mean age in years at Time 1	12.14	12.14	11.68	11.14
Age range in years at Time 1	9.50 – 15.75	9.17 – 15.75	9.42 – 14.92	9.25 – 12.33
Gender – n (%)				
Male	13 (40.6)	12 (57.1)	10 (62.5)	2 (18.2)
Female	19 (59.4)	9 (42.9)	6 (37.5)	9 (81.8)
IQ score[a]	10.99	9.33	10.28	9.55
Language[a]	10.81	8.66	10.97	7.60
Parental education level[b]	3.45	2.61	3.20	3.03
Communication mode - n (%)				
DSL/SSD	1 (3.1)	16 (76.2)	2 (12.5)	9 (81.8)
Spoken language only	31 (96.9)	5 (23.8)	14 (87.5)	2 (18.2)
Hearing loss in better ear – n (%)				
40-60 dB	15 (46.9)	5 (23.8)	0	0
61-90 dB	12 (37.5)	6 (28.6)	0	0
> 90 dB	4 (12.5)	8 (38.1)	15 (93.8)	9 (81.8)
unknown	1 (3.1)	2 (9.5)	1 (6.3)	2 (18.2)

Note. DHH = Deaf and Hard of Hearing, H = hearing; DSL = Dutch Sign Language, SSD = Sign supported Dutch. [a] For IQ and Language, age-corrected norm scores are presented. grand population mean is set to 10. [b] (1) no/primary education, (2) lower general secondary education, (3) higher general secondary education, (4) college/university.

Table S3. Participant characteristics per DHH group regarding Communication mode and amount of hearing loss.

	Communication mode		Amount of hearing loss		
	Spoken	DSL/SSD	mild	moderate	severe
No. of participants	52	28	20	18	36
Bullying	**1.41**	**1.56**	1.47	1.45	1.47
Victimization	**1.41**	**1.61**	1.42	1.52	1.50
Mean age in years at Time1	12.05	11.65	12.23	12.10	11.83
Age range in years at Time1	9.17 – 15.75	9.25-14.67	9.17 – 15.75	9.50 – 15.75	9.25-14.92
Male – n (%)	27 (51.9)	10 (35.7)	6 (30.0)	12 (66.7)	17 (47.2)
Female – n (%)	25 (48.1)	18 (64.3)	14 (70.0)	6 (33.3)	19 (52.8)
IQ score[a]	10.52	9.64	9.90	10.95	10.28
Language[a]	10.41	8.78	10.47	10.66	9.48
Parental education level[b]	3.23	2.92	3.18	3.19	3.16
Type of education - n (%)					
Regular education	**45 (86.5)**	**3 (10.7)**	15 (75.0)	12 (66.7)	19 (52.8)
Special education	**7 (13.5)**	**25 (89.3)**	5 (25.0)	6 (33.3)	17 (47.2)
Communication mode - n(%)					
DSL/SSD	-	-	**2 (10.0)**	**15 (27.8)**	**17 (47.2)**
Spoken language only	-	-	**18 (90.0)**	**13 (72.2)**	**19 (52.8)**
Type of amplification - n (%)					
Hearing aid	36 (69.2)	17 (60.7)	**20 (100)**	**18 (100)**	**12 (33.3)**
Cochlear implant (CI)	16 (30.8)	11 (39.3)	**0**	**0**	**24 (66.7)**
Hearing loss in better ear n (%)					
40-60 dB	**18 (34.6)**	**2 (7.1)**	-	-	-
61-90 dB	**13 (25.0)**	**5 (17.9)**	-	-	-
> 90 dB	**19 (36.5)**	**17 (60.7)**	-	-	-
unknown	**2 (3.8)**	**4 (14.3)**	-	-	-

Note. DSL = Dutch Sign Language, SSD = Sign supported Dutch. Values displayed in bold represent significant differences within DHH groups (e.g., between HA and CI group) at $p < .05$.[a] For IQ and Language, age-corrected norm scores are presented. grand population mean is set to 10. [b] (1) no/primary education, (2) lower general secondary education, (3) higher general secondary education, (4) college/university.

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SUPPLEMENTARY MATERIALS CHAPTER 6

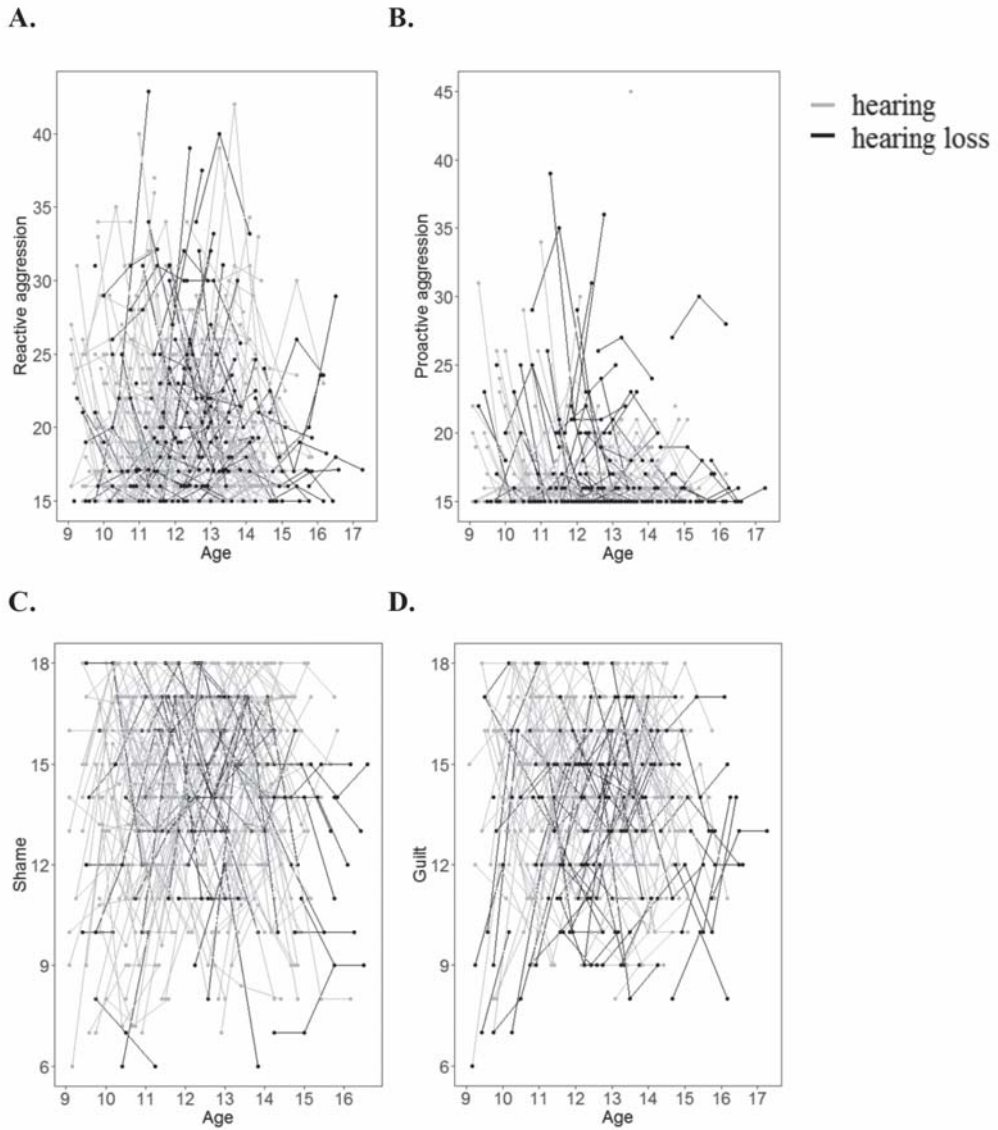**Figure S1.** Longitudinal graphic representation of age at the three time points of reactive aggression, proactive aggression, shame and guilt. Each participant is presented by an individual line and each time point is presented by a point. Adolescents with hearing loss are displayed in black and hearing adolescents in grey. **1A.** reactive aggression. **1B.** proactive aggression. **1C.** shame. **1D.** guilt.

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Table S1. Psychometric properties and mean scores of reactive aggression, proactive aggression, shame and guilt at the three time points per group

	No. of items	Range	Cronbach's α		Mean scores (SD)	
			HL	Hearing	HL	Hearing
Time 1						
Reactive aggression	15	15-45	.89	.89	20.36 (5.28)	20.41 (5.14)
Proactive aggression	15	15-45	.87	.90	18.23 (4.50)	16.47 (3.39)
Shame	6	6-18	.81	.78	13.00 (3.33)	14.03 (2.92)
Guilt	6	6-18	.80	.69	12.55 (3.08)	14.07 (2.50)
Time 2						
Reactive aggression	15	15-45	.91	.90	20.17 (5.52)	19.40 (4.90)
Proactive aggression	15	15-45	.92	.67	16.95 (4.00)	15.55 (1.28)
Shame	6	6-18	.69	.68	13.86 (2.58)	14.61 (2.61)
Guilt	6	6-18	.78	.69	12.96 (2.72)	14.38 (2.40)
Time 3						
Reactive aggression	15	15-45	.92	.87	21.09 (6.31)	18.68 (4.21)
Proactive aggression	15	15-45	.90	.77	16.94 (3.72)	15.75 (1.80)
Shame	6	6-18	.68	.75	12.70 (2.72)	14.12 (2.69)
Guilt	6	6-18	.69	.68	13.27 (2.51)	14.51 (2.51)

Abbreviations: HL = Hearing loss; SD: Standard deviation.

Table S2. An overview of missing data

	Participants		Missing			
	HL	Hearing	HL Count	HL %	Hearing Count	Hearing %
Time 1	*n* = 80	*n* = 227				
Age	80	227	0	0.0%	0	0.0%
Reactive aggression	78	227	2	2.5%	0	0.0%
Proactive aggression	78	227	2	2.5%	0	0.0%
Shame	78	227	2	2.5%	0	0.0%
Guilt	78	227	2	2.5%	0	0.0%
Time 2	*n* = 78	*n* = 197	2	2.5%	30	13.2%
Age	78	197	2	2.5%	30	13.2%
Reactive aggression	78	197	2	2.5%	30	13.2%
Proactive aggression	78	197	2	2.5%	30	13.2%
Shame	74	194	4	5.0%	33	14.5%
Guilt	74	194	4	5.0%	33	14.5%
Time 3	*n* = 64	*n* = 166	16	20.0%	61	26.9%
Age	64	166	16	20.0%	61	26.9%
Reactive aggression	64	166	16	20.0%	61	26.9%
Proactive aggression	64	166	16	20.0%	61	26.9%
Shame	63	166	17	21.3%	61	26.9%
Guilt	63	166	17	21.3%	61	26.9%

Note. HL = Hearing loss.

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Table S3. Linear mixed models examining the developmental trajectory of reactive aggression, proactive aggression, shame and guilt

	Reactive aggression	Proactive aggression	Shame	Guilt
Model 1				
Intercept	19.91***	16.40***	13.97***	13.90***
AIC/BIC	4768.54/4777.93	3993.65/4003.04	3773.36/3782.74	3592.39/3601.76
Df	3	3	3	3
Model 2				
Intercept	19.69***	16.03***	14.24***	14.26***
Group	.84	1.39***	-1.00***	-1.34***
AIC/BIC	4765.60/4774.99	3976.54/3985.93	3763.61/3772.98	3570.19/3579.56
df	4	4	4	4
Model 3				
Intercept	**20.92*****	**16.77*****	13.79***	13.89***
Group	**.97**	**1.47*****	-1.05***	-1.38***
Age(linear)	**-.38****	**-.23****	.14	.12
AIC/BIC	**4759.18/4768.57**	**3971.40/3980.78**	3763.37/3772.72	3570.54/3579.91
df	**5**	**5**	5	5
Model 4				
Intercept	20.70***	17.56***	**12.28*****	12.95***
Group	.99	1.41***	**-.93****	-1.31***
Age(linear)	-.22	-.81***	**1.25*****	.80***
Age(quadratic)	-.02	.08*	**-.16*****	-.10***
AIC/BIC	4762.90/4772.28	3970.55/3979.94	**3741.23/3750.60**	3562.70/3572.07
df	6	6	**6**	6
Model 5				
Intercept	21.07***	18.28***	12.13***	12.50***
Group	1.02	.15***	-.94**	-1.34***
Age(linear)	-.76	-1.84***	1.47**	1.46***
Age(quadratic)	.16	.44**	-.24	-.33*
Age(cubic)	-.02	-.03*	.01	.02
AIC/BIC	4767.95/4777.34	3972.26/3981.65	3747.72/3757.08	3566.58/3575.93
df	7	7	7	7
Model 6				
Intercept	21.29***	16.55***	12.32***	**13.15*****
Group	-.33	2.23***	-1.16	**-2.53*****
Age (linear)	-.50***	-.16	1.25***	**.80*****
Age(quadratic)	X	X	-.17***	**-.12*****
Age x Group	.38	-.22	.07	**.36***
AIC/BIC	4758.13/4767.52	3971.43/3980.82	3738.91/3752.27	**3558.42/3567.78**
df	6	6	7	**7**

$*p < .05, **p < .01, ***p < .001$.
Values for the best fitting model are displayed in bold.

Table S4. Correlations between the average score (of time1, time2, time3) of social emotions with aggression

	Proactive aggression	Shame	Partial[a]	Guilt	Partial[a]
Reactive aggression	.43***	.01	.10	-.13*	-.16**
Proactive aggression		-.13*	.04	-.29***	-.26***

Note. *p < .05, **p < .01, ***p <.001.
[a] Partial correlations were corrected for either shame or guilt.

LIST OF PUBLICATIONS

Broekhof, E., Bos, M. G. N., & Rieffe, C. (submitted). The role of social emotions and social access in the development of aggression; A longitudinal study in adolescents with and without hearing loss.

Eichengreen, A., **Broekhof, E.,** Güroğlu, B., & Rieffe, C. (in revision). Fairness decisions in children and early adolescents with and without hearing loss.

Novin, S., & **Broekhof, E.,** & Rieffe, C. (in press). Bidirectional relationships between bullying, victimization, and emotion experience in boys with and without ASD. *Autism*.

Rieffe, C., **Broekhof, E.,** Eichengreen, A., Kouwenberg, M., Veiga, G., da Silva, B. M. S., van der Laan, A., & Frijns, J. H. M. (2018). Friendship quality and emotion control in deaf and hard of hearing adolescents. *Journal of Deaf Studies and Deaf Education,* 1-10. Advance online publication. doi:10.1093/deafed/eny012.

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CURRICULUM VITAE

Evelien Broekhof was born on the 1st of March 1989 in Noordwijkerhout, the Netherlands. She graduated from Teylingen College Leeuwenhorst (high school) in 2008. In 2011 she obtained her bachelor degree in psychology at Leiden University (cum laude). In 2011 she started the research master developmental psychology at Leiden University, which she obtained in 2013 (cum laude). After graduation, Evelien worked as a junior researcher in the Focus on Emotions group under supervision of prof. dr. Carolien Rieffe.

In 2014, Evelien started her PhD research, again at Leiden University, under supervision of prof. dr. Carolien Rieffe and dr. Marieke Bos. Her research focused on longitudinal associations between shame, guilt, and aggression in typically developing adolescents, adolescents with an autism spectrum disorder and adolescents with hearing loss. In 2018, Evelien started working as a postdoctoral research associate for the project of dr. Anders Schinkel on the role of wonder in education for human flourishing at the Vrije Universiteit Amsterdam.

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