Mechanisms of social influence: Reputation management in typical and autistic individuals

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I hereby declare that, except where explicit attribution is made, the work presented in this thesis is entirely my own.

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Abstract

Other people greatly influence behaviour – a phenomenon known as social influence. One reason people change their behaviour when others are present is to manage their reputation. Individuals with autism have social and communicative difficulties, which may result in difficulties in reputation management. This thesis aimed to examine reputation management in autistic individuals, the development of reputation management, and the cognitive mechanisms underpinning reputation management. In Chapter Two, autistic adults managed their reputation in a donation task when it was explicitly clear that they *should* manage it. Despite this ability, the autistic adults demonstrated a reduced propensity for reputation management, which results suggested was due to low expectations of reciprocity. In Chapters Three and Four, reputation management and potential mechanisms – theory of mind, social motivation, reciprocity, and inhibitory control – were examined in typical children aged 6 to 14. Two forms of reputation management were tested: an automatic or implicit form and a deliberate or explicit form. Implicit reputation management appeared in adolescence, while explicit reputation management occurred at 8-years-old. Theory of mind and social motivation underpinned explicit reputation management. In Chapters Five and Six, autistic children did not implicitly manage their reputation, although some were able to do so explicitly. Autistic children who were fairer and more sensitive to reciprocity were more likely to explicitly manage reputation. None of the suggested mechanisms underpinned implicit reputation management in either typical or autistic children. Finally, semi-structured interviews were conducted with autistic adolescents and school staff (Chapter Seven). Thematic analysis showed that autistic adolescents were concerned about their reputation; however, many preferred to stay true to themselves rather than appear "cool". Overall, this thesis noted autistic individuals do have the ability to manage reputation, yet there was variation in this ability, due to a number of factors. These results suggest autistic individuals are not completely immune to social influence.

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ADOS	Autism Diagnostic Observation Schedule
APA	American Psychiatric Society
BOLD	Bold Oxygenation Level Dependent
CPT	Continuous Performance Task
d’	D prime
DSM	Diagnostic and Statistical Manual
fMRI	Functional Magnetic Resonance Imaging
IQ	Intelligence Quotient
ISI	Inter Stimulus Interval
LSA	Learning Support Assistant
ms	Milliseconds
PFC	Prefrontal Cortex
SCQ	Social Communication Questionnaire
SIAS	Social Interaction Anxiety Scale
SPS	Social Phobia Scale
ToM	Theory of mind
WAIS	Wechsler Adult Intelligence Scale
WASI	Wechsler Abbreviated Scale of Intelligence

Chapter One

Literature review

1.1. What does it mean to be social?

From infancy, human beings are thought to be inherently social, entering the world attuned with and interested in other people (Johnson, Dziurawiec, Ellis, & Morton, 1991; Reddy, 2008; Trevarthen, 2005). For example, faces – which can communicate a wealth of social information – are particularly potent stimuli for humans, even from a very young age (de Haan & Nelson, 1999). Human beings are social animals who spend a significant portion of their time within social situations. Several theorists (Adolphs, 2009; Dunbar, 1998, 2003; Frith, 2013) propose that the human brain has networks or regions dedicated to being social. Being social, therefore, is an important aspect of human life.

There are numerous benefits to being social: better well-being for those with greater social engagement (Glass, Mendes de Leon, Bassuk & Berkman, 2006), foraging gains through cooperation that potentially aided the evolution of the human race (Tomasello, Melis, Tennie, Wyman & Herrmann, 2012), and being part of a social group can help motivate children's learning (Master & Walton, 2013). Frith and Frith (2007) claim that humans are unique since a *shared* social world is created, with human beings above any other animal motivated to share and engage in each other's worlds. Further, the cultural intelligence hypothesis (Herrmann, Call, Hernandez-Lloreda, Hare & Tomasello, 2007) postulates that complex social life, underpinned by competition and cooperation, led to humans' "ultra social" nature. It seems, then, that considerable weight is applied to the notion of being social.

Understanding this notion of being social is of particular import when attempting to appreciate the lives of individuals who have specific difficulties with social communication. This thesis will look closely at the social behaviour, and its

underpinnings, of individuals with autism. Autism is a lifelong condition, best known for how it affects the way an individual interacts and communicates with others (American Psychiatric Association (APA), 2013) – although more research is needed to understand exactly *why* this is the case. One suggestion is that, in autism, social stimuli are processed differently in the brain (Castelli, Frith, Happé, & Frith, 2002; Critchley et al., 2000), and social information may not be given priority (Maestro et al., 2002), unlike individuals without autism who tend to highly prioritise social information.

One way to consider why autistic[1] individuals might process social information differently is to consider their propensity to social influence. Social influence is the susceptibility to the influence of others, and this thesis will focus on why people without autism appear to be remarkably susceptible to the influence of others, and why autistic individuals might not be, at different points in development – during childhood, adolescence and adulthood. Specifically, this thesis focuses on reputation management as a trigger for social influence: that a critical reason typical individuals change their behaviour when others are around is to maintain a certain reputation.

The main aim of this thesis was to consider social influence in both typical and autistic individuals. Specifically, this thesis will consider whether children, adolescents, and adults with (and without) autism attempt to manage reputation. This thesis will also examine the mechanisms that may underlie reputation management, in order to enhance our understanding of *how* individuals manage their reputation. The current chapter will now consider the previous literature concerning

[1] The terms "autistic person" and "person with autism" are used interchangeably throughout this thesis to respect the wishes of all members of the autism community (see Sinclair, 1999)

social influence, reputation management, and the proposed mechanisms for reputation management, in both typical and autistic individuals.

1.2. The history of social influence

For decades, the effect of other people on behaviour has fascinated psychologists, from developmental psychologists to neuroscientists. There are multiple ways in which others influence behaviour, from the subconscious mimicry of people we like (van Baaren, Janssen, Chartrand & Dijksterhuis, 2009), to conformity to the ideas of others (Asch, 1956). The very first experiments in psychology itself are thought to be in the area of social influence. Following his interest in the way cyclists became more competitive when together, Triplett (1898) tested whether children were affected by the presence of others. In this seminal work, children reeled a flag along a track, both when they were alone and when they were competing with another child. The majority of children were faster when there was another child and thus Triplett (1898) concluded that the presence of others could facilitate performance. Despite criticisms of the lack of statistical significance and possible misinterpretation of his results (Stroebe, 2012), Triplett's (1898) work led to a new age of social psychology.

After Triplett (1898), social psychologists considered whether mere presence –the presence of another person or audience, minus any competitive elements or other factors – could impact upon behaviour by facilitating performance (Guerin, 1993). Research examining social facilitation during the first half of the 20th century attempted to theorise the topic (Allport, 1924), but studies generally reported mixed findings (Dashiell, 1935). It was not until 1965 that Zajonc succinctly put forward a theory of social facilitation. Zajonc (1965) suggested that when people (and other

animals) were observed completing an easy task, performance was facilitated and they became better at the task. Such social facilitation effects have been found more recently with performance on easy video games improved by the presence of an audience (Bowman, Weber, Tamborini & Sherry, 2013). If the task was difficult, however, Zajonc (1965) noted that performance was inhibited and became worse when an audience was present. These conceptions formed part of Zajonc's (1965) drive model, which suggested that such effects occurred due to an increase in generalised drive. The concept of drive has been criticised as being too vague (Andrew, 1974). Although Zajonc (1965) likened drive to arousal, there has been no strong evidence of physiological changes when other people are present (Guerin, 1993).

Following Zajonc's (1965) drive theory, social conformity theories (e.g. Cottrell, Wack, Sekerak & Rittle, 1968) were proposed, followed by more cognitive explanations (e.g. Baron, Moore, & Sanders, 1978) of social facilitation. These theories will now be considered in turn.

In one social conformity theory, evaluation apprehension, Cottrell et al. (1968) proposed that an increase in *learned* rather than generalised drive occurs when others are present. What has been learnt is that others can evaluate one's behaviour, and it is the expectation of this evaluation that causes arousal which impacts on performance. This claim was based on Cottrell et al.'s (1968) finding that the presence of a blindfolded audience did not cause social facilitation effects, but a closely observing audience did – suggesting that something more than just mere presence is required to produce social facilitation. Similarly, other social conformity theories posited that another person's presence leads to increased awareness of behaviour, particularly whether that behaviour is normative, and a subsequent increase in conformity occurs

(Guerin, 1993). For example, self-presentation theory (Goffman, 1959) assumes that people attempt to present a particular image of the self when observed by others. Guerin (1993) suggests, however, that social conformity theories lose some of the simplicity presented by Zajonc (1965). For example, it is difficult to apply social conformity theories to evidence for social facilitation in animals, which is thought to occur due to hard-wired mechanisms rather than a learned process (Harlow, 1932; Tolman, 1964).

Cognitive theories – which assume that information is taken in, transformed, stored and acted upon – propose that the presence of a person affects which information is attended to. Distraction-conflict theory (Baron et al., 1978) claims attention can be shifted by the presence of others and conflict may occur when the person does not have enough attentional capacity to attend to both a person's presence and the task. This conflict, however, increases drive and facilitates performance (Baron, 1986). Another cognitive approach to social facilitation considered cognitive appraisals, specifically challenge appraisals and threat appraisals. Feinberg and Aiello (2010) found that participants who were threatened (told that the task was about speed and accuracy) performed worse when observed, and those who were challenged (told that the task was a challenge to overcome) performed better. These findings were irrespective of task difficulty, which the authors suggest undermine Zajonc's (1965) drive theory, which focussed on the importance of task difficulty as part of social facilitation.

A meta-analysis of 241 social facilitation experiments by Bond and Titus (1983) revealed that mere presence could only explain 0.03% to 3% of the variance in task performance. They found that the presence of others causes a reliable increase in speed during simple tasks, and the opposite effect in more complex tasks. There was

a slightly weaker effect of presence on task accuracy, with accuracy generally increasing in simple tasks and decreasing in complex ones. Also, the effect of evaluation was inconsistent and did not add to the previously mentioned effects, which goes against Cottrell et al.'s (1968) prediction that something more than mere presence is required for social facilitation effects. Changes in physiology were not found consistently across the 241 studies.

The picture of social facilitation appears to be more complex than first thought, but it does appear that compared to when we are alone, others affect behaviour. Aiello and Douthitt (2001) argue that other factors play an important role in moderating the effect, including the familiarity of the person observing and their physical proximity. Individual differences may also play a role, with differences in motivation, personality and intelligence impacting on how individuals react to the presence of others (Aiello & Douthitt, 2001). What is apparent, despite this phenomenon being around for over a century, is that we still do not fully understand exactly *why* we are affected by the presence of others.

Going beyond the area of social facilitation may help us to answer this question. Social influence is more than just social facilitation: others not only facilitate (or impair) behaviour, they can cause behaviour to change in other ways, such as by increasing prosocial behaviours. I now focus on one potential cause of this behaviour change: reputation.

1.2.1. Reputation

Reputation – how we believe we are seen in the eyes of others – is perhaps one of the strongest driving forces behind social influence. Our reputation is a social construction, based on what we believe others think of us (Emler, 1990).

Leimgruber, Shaw, Santos and Olson (2012) define reputation as the information possessed about an individual that can be used to guide expectations of how that person will act in the future. Reputation is therefore an important tool in partner choice (Barclay & Willer, 2007). Some authors argue that reputation is "everything" (Shaw, Li & Olson, 2013), and that reputation makes humans unique (Emler, 1990; Engelmann, Herrmann & Tomasello, 2012). Indeed, reputation transcends all areas of life – from the internet, to the workplace, to life at home or with friends (Tennie, Frith & Frith, 2010). Having a good reputation can reap great benefits – from being respected and trusted by others, to increasing sales of a company online (Resnick, Zeckhauser, Swanson, & Lockwood, 2006).

Reputation may also be used to influence others, for example, to encourage others to be more generous (Reinstein & Reiner, 2012) and maintain contributions to a public good (Milinski, Semmann & Krambeck, 2002), with reputation acting as a reminder to encourage other individuals to be generous. Reputation can be used as a regulator of behaviour (Casiglia, Lo Coco & Zappulla, 1998), used to determine behaviour by enforcing norms (Giardini, Conte & Paolucci, 2013; Tomasello & Vaish, 2013). For example, an individual may abide to social norms more in the presence of others than when alone.

From an evolutionary perspective, reputation is valuable for cooperation. Individuals with a reputation for being cooperative are more likely to be selected as partners in the future (Barclay & Willer, 2007; Sylwester & Roberts, 2010). Furthermore, Sommerfeld, Krambeck and Milinski (2008) noted that learning about others' reputations could increase cooperation. Several authors suggest that using reputation to select cooperative partners increased the human race's chances of survival, since cooperating in groups may have aided human evolution by increasing gains in terms

of foraging (Rand & Nowak, 2013; Tomasello et al., 2012; Tomasello & Vaish, 2013). Some authors (Karlan & McConnell, 2014; Krasnow, Cosmides, Pederson & Tooby, 2012) suggest that reputation serves to benefit the self by boosting self-image, rather than to maintain group harmony and norms. Reputation may benefit the self, but ultimately it *can* benefit the group by encouraging cooperation (Semmann, Krambeck & Milinski, 2005).

Reputation Management. Reputation management is the effort individuals make to maintain or obtain a desired reputation: people attempt to control what others think by changing their behaviour when others are present to uphold a good reputation (Benabou & Tirole, 2005). Reputation management involves weighing up current costs that may ultimately lead to a good, beneficial reputation in the future (Knoch, Schneider, Schunk, Hohmann & Fehr, 2009).

The first theorising on reputation management came in the form of Goffman's (1959) self-presentation theory. According to this theory, the world is a stage upon which people project an image of the self that they wish others to see. Self-presentation is thought to be strategic, occurring in order to enhance and improve the self (Banaji & Prentice, 1994). Baumeister (1982) suggested that people are motivated to present a desirable image to others, due to a desire to obtain the reward of positive regard from others and to fulfil the "ideal self". Mirroring this, the impression management model (Leary and Kowalski, 1990) proposed two components to impression management. The first component is that people are motivated to control the impression that they present to others (impression motivation). The second is that people decide exactly what impression they would like to present and how to create it (impression construction). Reputation management is conceptualised in a similar

way: reputation is constructed and signalled to others, with the intention of gaining rewards from others (Tennie et al., 2010).

There may be several steps that occur for an individual to manage their reputation (Banerjee, 2002a). First, the individual must be aware that they have a reputation held by others (even if the exact content of this reputation is unknown) and that this reputation is not a fixed entity (Shaw et al., 2013). Second, the individual must be concerned about the content of their reputation. Third, there must be motivation to either maintain a particular reputation or obtain a preferred reputation. This motivation should lead to a change in behaviour, and thus, reputation management.

The effects of reputation management can be seen as an increase in prosocial behaviour. For example, the presence of a pair of eyes increased donations to a university coffee collection (Bateson, Nettle & Roberts, 2006). This effect has been shown in other experiments testing the impact of such subtle cues on donation behaviour (Haley & Fessler, 2005; Oda, Niwa, Honma & Hiraishi, 2011; Powell, Roberts & Nettle, 2012), littering rates (Bateson, Callow, Holmes, Redmond Roche & Nettle, 2013; Ernest-Jones, Nettle & Bateson, 2011) and crime and anti-social behaviour (Nettle, Nott & Bateson, 2012b). In a meta-analysis of studies testing this "eyes effect", Nettle, Harper, Kidson, Stone, Penton-Voak and Bateson (2012a) came to the conclusion that the presence of a pair of eyes will increase the probability of donating, but the mean donation does not increase – implying that eyes reduce variation in behaviour by increasing conformity to social norms.

The fact that such subtle cues can enhance prosocial behaviour demonstrates the power that the implication of observation can have. This effect has also been found in the social facilitation literature, where the knowledge of others performing the

same task in another room can cause social facilitation (Dashiell, 1930). In experimental tasks where people have the opportunity to demonstrate their generosity, researchers have consistently found that people tend to become more generous when they believe they are being observed (Andreoni & Petrie, 2004; Ariely, Bracha & Meier, 2009; Kurzban, DeScioli & O'Brien, 2007; Lamba & Mace, 2010; Rege & Telle, 2004). Reputation management appears to be an important trigger for such behaviour: what people believe others think of them leads to an enhanced awareness of behaviour, which leads to an increase in prosocial behaviour (Benabou & Tirole, 2005). Arguably, this could be a subconscious, implicit or automatic process, whereby people are not necessarily aware that they are changing their behaviour (Izuma, 2012). Yet, there may be occasions where reputation is consciously considered. Fehr and Schnieder (2010) found that only explicit reputation cues (telling participants of other participant's actions (i.e. reputation) in a trust game) triggered strong reciprocity (accepting a loss in order to punish another for their actions), while subtle cues did not. As such, there appears to be a distinction between explicit and implicit forms of reputation management.

Explicit and implicit reputation management. The notions of explicit and implicit cognition are a common feature of psychology. From explicit and implicit attitudes (Gawronski & Bodenhausen, 2006), to distinguishing between explicit and implicit theory of mind (ToM; Frith & Frith, 2007, 2008a, 2011), it is theorised that people process the social world both with and without awareness (Bargh, 1984). Accordingly, implicit processing can be thought of as automatic and inflexible, while explicit processing can be thought of as conscious and flexible (Frith & Frith, 2008a). In terms of reputation, a distinction between implicit and explicit reputation management has been proposed (Amodio & Frith, 2006; Shaw et al. , 2013). On the

one hand, an individual could *implicitly* manage their reputation without awareness that they are doing so. Evidence of this implicit reputation management comes from the fact that people can be susceptible to cues of being observed (e.g. Nettle et al., 2012a) and alter their behaviour in subtle ways. Such automatic reputation management would be beneficial in monitoring behaviour without conscious effort. The procedure for this automatic or implicit reputation management is unclear: subtle cues such as the presence of other people may elicit subconscious awareness of one's reputation, and slight behaviour changes occur that modify one's actions to be in line with normative behaviour. These steps for implicit reputation management echo Cottrell et al.'s (1968) evaluation apprehension theory of social facilitation (see section 1.2). This theory claims that subtle changes in behaviour (such as socially facilitated behaviour) when others are present is driven by a learned expectation that others will judge one's behaviour. Perhaps, then, implicit reputation management occurs due to this learned expectancy of others assessing one's reputation.

On the other hand, *explicit* reputation management occurs when an individual is consciously aware that their reputation is at stake, and they make a deliberate effort to manage their reputation. As previously discussed, this effort has been quantified in the self-presentational literature, where individuals actively present themselves in a certain light (Banerjee, 2002b). For example, individuals may boast or self-promote to successfully obtain employment. However, self-presentation is more strategic than explicit reputation management (Shaw et al., 2013). For example, explicit reputation management refers to a slightly more subtle process of upholding of a certain reputation (e.g. "I want this person to like me, so I will act like a kind person"), whereas self-presentation is more deliberate and premeditated (e.g. "I want this person to like me so I can get a job, therefore I will tell them all of my qualities").

Although reputation management has been suggested to be the cause of an increase in prosocial behaviour when others are present, the question becomes one of exactly *how* individuals manage reputation. There are two main proposed mechanisms, theory of mind and social motivation, in addition to other potential mechanisms – reciprocity and inhibitory control – whose relationship to reputation management have yet to be examined.

1.3. Which mechanisms underlie reputation management?

Theory of mind. The description of reputation management itself involves assessing what other people might think about the self – a recursive, meta-cognitive ability that echoes the concept of theory of mind (ToM). ToM, or mentalising, is the ability to think about what others are thinking – to understand that other people have thoughts, desires and beliefs, all of which can be different from your own and from the state of reality. Premack and Woodruff (1978) were the first to coin the term "theory of mind" when questioning whether chimpanzees could possess such an ability. Following this seminal work, a wealth of research has attempted to determine the developmental origins of ToM in humans (Flavell, 1999). Usually, the hallmark of possessing a ToM is the successful passing of a false belief task. False beliefs are beliefs that are not true of reality. For example, an individual could believe that they have left their bicycle outside when in reality it has been stolen. Wimmer and Perner (1983) designed the false belief task on the basis of this general premise. The standard procedure for the task (also known as the Sally-Ann task; see Baron-Cohen, Leslie & Frith, 1985) is as follows. Participants are told that Maxi has placed his chocolate in the cupboard, and then he goes out to play. While he is outside, his mother moves the chocolate to a new location. Participants are then asked where Maxi will look for his chocolate on his return. To pass this task, participants must

correctly infer that Maxi will look in the location he last left the chocolate, where he (falsely) believes it to be. Success on this task reflects the ability to think about another's thoughts – or first-order ToM – and children over four reliably begin to pass this task (Wellman, Cross & Watson, 2001).

Second-order ToM, the recursive ability to think about what others are thinking about others' thoughts, is decidedly more complex. For example, Perner and Wimmer (1985) tested children's understanding of "John thinks that Mary thinks that..." in their Ice Cream Story task, where two characters have independently been informed of an ice cream van moving location – although John does not know that Mary also knows the van has moved. Children are asked where John thinks Mary will go to get ice cream. It is not until around 6 to 7 years of age that children correctly ascertain that John would believe Mary would go to the old location. Happé's (1994) Strange Stories task is frequently used to measure second-order ToM, with stories considering various aspects of ToM such as double bluffs, irony and sarcasm. Recent research (Grueneisen, Wyman & Tomasello, in press) has found that 6-year-olds can reason using second-order ToM to align and coordinate with peers to pursue a shared goal. Understanding others' minds is thus important for everyday social interaction.

Apperly (2012) argues that ToM has previously been considered theoretically in three ways: as a conceptual problem, as a set of cognitive processes, or as social motivation. As a conceptual problem, this assumes that individuals either have or do not have the concept of other minds. However, if ToM was purely conceptual, it would be difficult to explain why children pass some ToM tasks but not others. As such, ToM may be more than just a concept. Executive processes, such as inhibition, may form part of ToM being a set of cognitive processes – with ToM dependent in

part on such executive functions. Finally, individual differences in social competence or motivation are thought by Apperly (2012) to play an important role in social ability. For example, typical children rated as the most socially competent by their teachers were also more successful on false belief tasks (Razza & Blair, 2009). Apperly (2012; Samson & Apperly, 2010) argues that ToM is not *just* a concept – it is something cognitive that we use and reason with, and that some may be more motivated to use than others.

Theorising about what others are thinking is a difficult skill – involving guesswork as to what is going on inside another person's mind, and even adults struggle to correctly implement this skill at all times (Keysar, Lin, & Barr, 2003; Samson & Apperly, 2010). Adults and children can also be susceptible to biases, such as an egocentric tendency to take into account their own perspective during false belief tasks (Birch & Bloom, 2007, 2004). Further, the use of false belief as a measure of ToM has perhaps over-dominated the field. Indeed, Apperly (2012) suggested that researchers have only been studying ToM with a very narrow range of tasks, which may limit what is known about ToM. Bloom and German (2000) also identified several problems with the classic false belief task. First, in order to pass the false belief task, other skills, such as attention, memory and language, are required. For example, an individual needs to hold several representations in mind, and be able to inhibit answering based on their own knowledge. Recent evidence has shown that altering the task demands, such as by allowing the child to control a doll who possesses the false belief, can enable 3-year-olds to successfully pass false belief tasks (Rubio-Fernandez & Guerts, 2013). Second, Bloom and German (2000) argue that there is more to ToM than just false beliefs. For example, people can use another's eye gaze to infer objects of their attention and share interest with them

(Frischen, Bayliss, & Tipper, 2007). This ability does not require the individual to think about beliefs that are false. Finally, social decision making does not just involve ToM – it also requires empathy and perceptual processes (Frith & Singer, 2008; Tager-Flusberg, 2007), to guide the choices people make in their social lives.

Theoretical accounts of ToM have advanced such that there is now a general acceptance that ToM can either be explicit or implicit (Frith & Frith, 2008a; Ruffman, 2014) and the underlying neural networks support this proposition (Adolphs, 2009; Van Overwalle & Vandekerckhove, 2013). Implicit ToM is unconscious, automatic, and inflexible, demonstrated by the fact that 3-year-old children, who do not verbally pass the false belief task, *look* at the correct location (Clements & Perner, 1994). There is some evidence to suggest that even 7-month-old infants can automatically compute the beliefs of an agent (Kovacs, Teglas, & Endress, 2010; see Onishi & Baillargeon (2005) for evidence at 15 months and Heyes (2014) for alternative explanations). Explicit ToM is the conscious, effortful, flexible means of thinking about another's thoughts, for example, expressing verbal understanding of false beliefs (Frith & Frith, 2008a). It is not until children are 4 years old that they consciously report explicit verbal understanding that others' beliefs can be different to the current state of reality (Wellman et al., 2001).

As previously mentioned, the definition of reputation management seems to be imbued with the ability to think about and track other's thoughts (Frith & Frith, 2008a). ToM is often thought of as a hallmark of social skills – someone with great skill in theorising about others' minds can predict others' behaviour (Astington, 1994), manipulate others (Sodian, Taylor, Harris & Perner, 1991) and achieve successful social relationships (Baron-Cohen et al., 1985). Young children with better ToM skills have been noted to share more than those with poorer ToM skills

(Wu & Su, 2014). Indeed, Byom and Mutlu (2013) claim that social success is related to ToM, through enabling the sharing of knowledge and the perception of others' perspectives.

It would appear that ToM may be a necessary skill for managing a good reputation (Amodio & Frith, 2006). First, being able to think about another's thoughts is likely to cause reflection on how one might look in the eyes of that person. Second, one can use ToM to manipulate and manage what another person thinks, with prosocial behaviour likely to produce a reputation for being a good person (Benabou & Tirole, 2005). There is some evidence of links between ToM and reputation management. Banerjee and Yuill (1999) note that in children, better ability to predict self-presentational facial displays (for example, a person smiling rather than frowning when they receive a present they do not like) was correlated with improved performance on second-order ToM tasks. There may also be some relationship between ToM and the ability to develop successful friendships (Petrina, Carter & Stephenson, 2014). As such, those with better ToM skills may be better at managing their reputation.

Social motivation. There is arguably more to reputation management than just the ability to think about others' thoughts, and another potential mechanism for reputation management is social motivation. Those who are more socially motivated may be more likely to manage their reputation due to a greater desire to be viewed positively by other people. I will now consider several facets of social reward, including the motivation for social rewards, alongside evidence to suggest that social motivation is necessary to produce reputation management.

There are three aspects of social reward: learning, affect and motivation, with each component potentially mediated by different parts of the brain (Berridge & Robinson, 2003). The first component, learning, is crucial. People learn what happens when certain stimuli are chosen and this may determine whether this stimulus is selected again in the future. Second, the stimulus itself can produce pleasurable and affective feelings. Finally, the reward has to be wanted or desired so that the individual is motivated to take actions to obtain the reward (Berridge & Robinson, 2003).

In the brain, learning (in particular stimulus-response learning) is thought to activate several neural structures including the amygdala, ventral striatum and prefrontal cortex (PFC; Cardinal, Parkinson, Hall & Everitt, 2002). The affective component is assumed to relate to activity in the ventromedial PFC (Grabenhorst & Rolls, 2011), and motivation with the ventral striatum, amygdala and nucleus accumbens (Berridge & Robinson, 2003; Kohls, Chevallier, Troiani & Schultz, 2012), although a rewarding stimulus is likely to activate many different brain areas at the same time (Berridge & Kringelbach, 2008). Dopamine, and the corresponding dopamine neurons, appears to be important in signalling reward (Schultz, 1998). Indeed, many of the aforementioned areas of the brain could be conceptualised as the mesolimbic dopamine projection system (Dichter, Damiano & Allen, 2012a).

As previously mentioned, maintaining a good reputation is something that many people work tirelessly for. Reputation has perhaps become even more salient given the age of the internet, where a company or product's reputation can be stated with rating systems or reviews, and such indicators (although not so subtle) can damage a company's reputation (Resnick et al., 2006; Tennie et al., 2010). Kohls et al. (2012) have suggested that the affective and motivational components of reputation are

crucial for people to strive towards reputation management. Indeed, Falk, Way and Jasinska (2012) suggest that social influence shares its neurological underpinnings with sensitivity to reward. For example, Izuma, Saito, and Sadato (2010) measured brain activity using fMRI while participants completed a donating to charity task when alone and when observed. They found that the ventral striatum was activated during observation, in addition to the medial PFC, an area they suggested to be used for representing reputation. Furthermore, Phan, Sripada, Angstadt and McCabe (2010) found that in a trust game, people who cooperated with partners with a reputation for reciprocation showed activity of the ventral striatum, but not when cooperating with partners who had a reputation for not reciprocating. Therefore, not only is it rewarding to have a good reputation for oneself, it also seems rewarding to interact with others who have a good reputation.

A consistent formulation of theories of self-presentation (section 1.2.1) is that people are motivated and consequently rewarded by working towards a particular image (Baumeister, 1982; Goffman, 1959; Leary & Kowalski, 1990). A good reputation rewards the self by ensuring that people are chosen as cooperative partners in the future (Sylwester & Roberts, 2010). From the presented evidence, it could be suggested that social motivation is necessary for the occurrence of reputation management – if people did not find reputation rewarding, then one might assume that they would not make great efforts to manage their reputation. Clearly, the motivational aspects of reputation need to be considered when conceptualising reputation management.

Reciprocity. A key aspect of social behaviour is that it is often reciprocal. Although reciprocity can have different facets (see below), reciprocity can broadly be defined as a response to others actions or intentions (Falk & Fischbacher, 2006). Reciprocity

is an important concept that links to reputation, first, since having a reputation for being a reciprocal individual could lead to cooperation from others (Phan et al., 2010), and second, since reciprocity is thought to be an internalised norm, many individuals see the returning of favours as a social rule (Burger, Sanchez, Imberi, & Grande, 2009). Therefore, others' reputations can be judged based on reciprocal behaviour (Phan et al., 2010).

Two types of reciprocity are of particular importance: direct and indirect reciprocity. Direct reciprocity involves direct experience with another person, whereby one can respond to another's behaviour through reward, punishment or reciprocation (Falk & Fischbacher, 2006). In this way, one can directly learn about others' reputations, and vice versa. Indirect reciprocity occurs when behaviour toward another person is rewarded or punished by a third party: indirect reciprocity can therefore be seen as a means of transmitting reputational information (Engelmann & Fischbacher, 2009). Here, one can learn about the reputations of others through others, or one's own reputation can be spread to others. Direct and indirect reciprocity can interact together to aid an individual's decisions on how to act toward another person (Molleman, van den Broek, & Egas, 2013).

Also, fairness decisions may come into play when considering whether one should reciprocate or not. Fairness is an other-regarding behaviour, and appears around 5 years of age and continues to increase throughout development (Overgaaw, Güroglu & Crone, 2012). For example, 5-year-olds systematically punish a mean, unfair puppet even at a cost to self, by spending a coin to take five coins from the mean puppet (Robbins & Rochat, 2011). Research suggests that while young children report that people *should* be fair and equal in resource distribution, they themselves are not fair in practice (Blake, McAuliffe & Warneken, in press; Sheskin, Bloom &

Wynn, 2014; Smith, Blake, & Harris, 2013). Furthermore, Sheskin et al. (2014) noted that children under the age of 7 tended to choose a cost to another child so that they could receive more themselves, rather than choosing an equal option. Fehr, Bernhard and Rockenbach (2008) observed a shift from children being egocentric to more considerate of others' perspectives between 7 and 8 years. These findings suggest that it is not until children are older that they act reciprocally and fairly. In adulthood, acting fairly can signal reputation by demonstrating that the individual is fair and they expect reciprocity as a result of this fairness (Hoffman, McCabe & Smith, 2008).

Humans are thought to frequently utilise reciprocal principles to enforce cooperative behaviour (West, El Mouden, & Gardner, 2011). Economic games are games used in psychology to test social decision-making, since people tend to behave in ways that indicate that they have social preferences, rather than behaving to receive the most gain for the self (Gummerum, Hanoch & Keller, 2008). For example, reciprocal behaviour – and expectations of reciprocity from others – is thought to affect the fact that humans do not act in an economically rational manner in economic games (Kahneman, 2003), instead acting as though they follow a norm of reciprocity (Camerer & Fehr, 2002). Thus reciprocity could be thought of as a reputational signal, to indicate whether it would be worth cooperating with a certain individual (Hoffman, McCabe, & Smith, 1998). A better understanding and expectation of reciprocity may therefore underlie reputation management, by guiding decisions concerning whether one should manage their reputation or not (Molleman et al., 2013). However, the relationship between reputation management and reciprocity has yet to be examined.

Inhibitory control. Being able to manage one's reputation could also require self-control in order to inhibit behaviours that could be detrimental to one's reputation. Inhibition is one of several executive functions, which also includes working memory, planning, and shifting between tasks (Huizinga, Dolan, & van der Molen, 2006). These cognitive processes are thought to underlie goal-directed thought and behaviour (Best & Miller, 2010) and help people to think flexibly (Prencipe, Kesek, Cohen, Lamm, Lewis & Zelazo, 2011). Executive functions develop and mature throughout childhood and adolescence (Blakemore & Mills, 2014). Indeed, Riggs, Jahromi, Razza, Dillworth-Bart, and Mueller (2006) suggest that executive functions contribute to social-emotional competence in children. For example, children who are better at delaying gratification by resisting the temptation of an immediate reward in exchange for a later, larger reward, perform better academically and are less stressed in later life (Shoda, Mischel, & Peake, 1990).

This thesis will specifically consider inhibition skills. These skills can be found early in childhood, when children manage to delay gratification for a reward from around 2 years, and more complex inhibition skills, such as inhibiting a prepotent response, continue to develop from 3 years of age (Garon, Bryson & Smith, 2008). Inhibition skills are useful for controlling oneself: while it appears young children can be egotistical, this is not thought to be caused by a lack of understanding of social norms but, rather, a failure in the ability to control themselves when tempted by selfish behaviour (Steinbeis, Bernhardt & Singer, 2012). Being able to control selfish impulses could be an important skill for managing reputation, so that individuals present a desired image. Additionally, executive functions impact on the decisions we make (Prencipe et al., 2011), and could therefore impact upon the decisions made related to reputation management. However, the proposed relationship between

inhibitory control and reputation management has yet to be examined experimentally.

Relationships between suggested mechanisms. The suggested mechanisms are not mutually exclusive, and likely impact one another. As mentioned above, for example, ToM may also require social motivation to actually be used (Apperly, 2012). Overlap between ToM and executive functions has also received considerable research attention, given the suggestion that these two mechanisms are strongly related (Carlson & Moses, 2001), with executive functions thought to underpin ToM ability (Pellicano, 2007). For example, recent research suggests that executive function is used for coordinating own and others' perspectives (Fizke, Barthel, Peters & Rakoczy, 2014). Inhibitory control has also been suggested to relate to fairness decisions, such that children are able to utilise their inhibition skills with age, enabling them to act fairly rather than selfishly (Steinbeis et al., 2012). Reciprocity and ToM are also thought to have links (Castelli et al., 2010). For example, Fett et al. (2014) found that adolescents with better perspective taking skills were more cooperative, yet if they were treated unfairly, they dramatically reduced their reciprocal behaviour. These suggested relationships should be considered as part of a complex underpinning of reputation management.

1.4. How does reputation develop?

Considering reputation and social influence more broadly within a developmental context might help to determine *why* people are affected by the presence of others: what, developmentally, leads individuals to care about what others think of them? There are two possible competing explanations of how reputation develops, which may help to answer this question. First, there is the contention that reputation is an

intrinsic drive from a young age. Rochat (2009) theorises that it is through fearing what others think of us that we come to define the self – that people are conscious of the self precisely because they are conscious of what others think. Accordingly, a fear of social rejection develops which drives people to act in certain ways, such as conforming. Rochat, Broesch and Jayne (2012) found that when they created a norm of having a sticker on one's forehead (by surreptitiously putting stickers on the child's mother and the experimenter) 2-year-old children were more reluctant to remove the sticker on their own head when they saw their reflection in a mirror. Children who did not witness this norm did not exhibit this behaviour. The authors suggest that this shows that even children as young as 2 years old attempt to adjust to perceived norms and that they do this due to an intrinsic drive to fit in with others.

Proponents of the Terror Management Theory (Pyszczynski, Greenberg & Solomon, 1997) also propose this inherent fear and subsequent reputation management. Thus, from a young age there is a need to manage reputation in front of others in order to avoid rejection and satisfy the need to belong (Baumeister & Leary, 1995). Such theorising may fit with social motivation being the primary mechanism behind reputation management. From a young age, being viewed positively by others is something children find rewarding and strive towards, and subsequently develop the skills necessary to achieve a good reputation.

Other theorists, however, argue against the idea of an intrinsic drive to manage reputation. Instead, reputation management is proposed to develop later in childhood as children learn the norms of their social group and culture (Hepach, Vaish & Tomasello, 2012). Subsequently, children learn what is socially acceptable (or not) in order to know that they *should* be managing their reputation in accordance with such norms. This theory may necessitate ToM. Banerjee's (2002a) work on self-

presentation in childhood suggests that ToM abilities are correlated with children's understanding of self-presentational behaviours. Banerjee (2002a, 2002b), however, highlights a need for both ToM abilities *and* motivation – children need to be able to represent what others think of them and be motivated to manage this. Following this, it may be the case that representational ability precedes the motivation to manage reputation.

Considering some of the preceding developmental steps before reputation management first occurs may be useful for conceptualising its development. Once children become self-aware, around the age of 2 (Amsterdam, 1972), they soon demonstrate self-conscious emotions, such as embarrassment and pride (Lewis, Sullivan, Stanger & Weiss, 1989). Such emotions indicate that the child is aware that the self is under scrutiny from others (Lewis, 1991) and an audience appears to be an important factor in the display of embarrassment and pride (Seidner, Stipek & Feshbach, 1988), indicating a possible rudimentary awareness of reputation. Furthermore, from 5 years of age children start to adopt behaviours which may be designed to influence others, including ingratiating behaviours like flattery (Fu & Lee, 2007). Feasibly, these behaviours could form part of the development of reputation management.

As mentioned previously, reputation management often manifests itself in prosocial acts, such that individuals might act prosocially to improve their reputation. Children appear to be prosocial from a very young age, around 8 months old (Hay, 1994). For example, 8-month-old children will altruistically help an experimenter to achieve a goal (Warneken & Tomasello, 2006). Such evidence is thought to point towards an early disposition towards prosociality. Yet, it is unclear what drives such behaviour: whether young children are prosocial for the sake of helping others or to ultimately

gain something for the self. Infants may start life being naturally prosocial, but at some point in development prosocial behaviour may become selective and potentially underlain with ulterior motives – such as to obtain a good reputation (Sebastian-Enesco, Hernandez-Lloreda & Colmenares, 2013).

Young children may also have knowledge of others' reputations: 3-year-old children choose partners who are helpful and cooperative over those who are not (Dunfield, Kuhlmeier, & Murphy, 2013; Melis, Altrichter & Tomasello, 2013; Warneken, Lohse, Melis & Tomasello, 2011) and 4-year-olds trust accurate informants over ignorant speakers (Koenig & Harris, 2005), suggesting that preschoolers may be able to utilise reputational information for partner choice. Meristo and Surian (2013) used a violation of expectation paradigm with 10-month-old children and found that infants looked longer when a character helped another character who they had just witnessed being unfair, as the infants expected the character to be punished for being unfair, not to be helped. Further, Hamlin, Wynn, Bloom & Mahajan (2011; see also Kenward & Dahl, 2011) discovered that 8-month-old infants preferred a puppet who punished an antisocial puppet. However, these studies do not show evidence of an active process of reputation management – rather, that young children may have an *awareness* of reputation before managing their reputation.

Recent evidence directly testing reputation management in children suggests that reputation management can occur from 5 years of age. Leimgruber et al. (2012) found that 5-year-old children could target their generosity dependent on the knowledge of the child they were sharing with. In their study, children could receive or send stickers to another child. Even if the receiver could observe the sender allocating stickers, the sender could place the stickers in opaque or transparent containers. When the containers were opaque – so only the sender would know how

many stickers were inside – 5-year-old children acting as senders were significantly less generous than if the containers were transparent. Leimgruber et al. (2012) claimed that 5-years-olds are sensitive to reputational cues such as the transparency of their actions, and are motivated not by an intrinsic drive to be prosocial but an extrinsic need to *appear* prosocial. They suggest that this tendency occurs before any explicit understanding of reputation.

Further evidence supports the idea of reputation management from 5 years of age. In a game where children were given the opportunity to share or to steal another child's stickers to complete a picture, Engelmann et al. (2012) found that more sharing and less stealing occurred when children were observed by a peer. Yet children do not require a peer to be present in order to manage reputation. Piazza, Bering and Ingram (2011) found that children aged 5 to 9 years cheated less when they believed an invisible person was observing them. Engelmann et al. (2012) argue that the development of the ability to manage reputation is a relatively slow process, which develops as children have more peer experiences, leading to older children and adolescents developing a particular concern for reputation as group belonging becomes of upmost importance.

Further, 6-year-old children can operate a "veil of fairness" (Shaw, Montinari, Piovesan, Olson, Gino & Norton, 2014). In Shaw et al.'s (2014) study, children could decide if they wanted to choose a coin toss to assign good or bad prizes for themselves and for another child, or they could choose the prize they wanted without implementing the coin toss. Most children from the age of 9 performed the coin toss over taking a prize immediately for themselves. However, children were allowed to check the result of their coin toss alone. For those who had chosen the coin toss, more children – including 6-year-olds – than would be expected by chance reported

that they had won the toss and thus won the good prize. It seems that even at this age, children will attempt to project an image of being a fair individual.

Shaw et al. (2013) suggest that there are two potential explanations as to why people manage reputation – first, that they want to avoid being excluded for being ungenerous, and second, to seek out opportunities to promote social status. Even at a relatively young age, children form social groups and are sensitive to their in-group (Schmidt, Rakoczy & Tomasello, 2012), demonstrating the need to belong to part of a group: often suggested as an intrinsic human motivation (Baumeister & Leary, 1995). Being part of a group is thought to have positive outcomes for children's learning – often, they work better in a group that they identify with (Master & Walton, 2013). Appreciating how and *why* typical children are affected by other people, as this thesis intends to examine, is vital for understanding a child's behaviour within social contexts.

Our understanding of reputation management could also be enhanced by considering a population of individuals who have difficulties with social communication, namely, individuals with autism.

1.5. Autism

Those with autism, a neurodevelopmental condition, form a wide spectrum of heterogeneous individuals making up around 1% of the UK population (Baird et al., 2006). Autistic individuals have marked social and communicative difficulties which affect everyday life, as well as restricted and repetitive interests (APA, 2013). Thus, individuals with autism have a number of social and non-social difficulties. These social difficulties include problems with making friends (Petrina et al., 2014) and understanding what others are thinking (Baron-Cohen et al., 1985). Non-social

difficulties include sensory sensitivities (Rogers & Ozonoff, 2005) and problems with some motor skills (Provost, Lopez & Heimerl, 2007). Autism was defined by Kanner (1943), who was the first to quantify the children he had come across in his work as physician. He noted their insistence on sameness and an "autistic aloneness" preventing them from forming social relationships, but some had preserved abilities such as excellent memory (Frith, 2003). Around the same time as Kanner (1943), Hans Asperger (1944) described a similar group of individuals, later referred to as those with Asperger's syndrome. The primary difference between autism and Asperger's is that in Asperger's language is not delayed. However, the current Diagnostic and Statistical Manual of Mental Disorders - V (DSM-5; APA, 2013) does not separate a diagnosis of Asperger's syndrome from autism, instead collapsing the diagnosis category into one of "Autism Spectrum Disorder", although those who already have a diagnosis of Asperger's can retain this diagnosis. Within the autism spectrum, the level of cognitive functioning ranges widely as well as the degree of adaptation, with some individuals who may appear to be relatively well adapted to everyday life to those who will never live independently.

There is also vast heterogeneity in the degree of social difficulties in autism, thus constituting the "autism spectrum" (Bowler, 2007). Wing and Gould (1979) were the first to acknowledge that autism could consist of a spectrum of individuals, following their epidemiological survey of severely autistic children. They conceptualised three different types of autistic children: those who were odd, aloof, or passive. The aloof child appears to be in their own world, avoiding social contact with others. The odd child likes other people, but to the point of being inappropriate in his or her approaches. Finally, the passive child can seem receptive to social contact but does not necessarily like it, and can be upset by changes in routine. In clinical terms, the

diagnostic criteria for autism state that the individual may have difficulties with developing and maintaining appropriate peer relationships and show a lack of social and emotional reciprocity (APA, 2013). Within diagnostic instruments, such as the Autism Diagnostic Observation Schedule (ADOS; Lord et al., 2000), clinicians look for certain behaviours such as reduced reciprocal communication, unusual eye contact, and reduced social engagement, in order to come to a diagnosis of autism. Autism, then, is often viewed as a condition of altered social functioning.

Much of the previous discussion has focussed on autism as a condition in childhood, yet autism extends throughout life. Cognitively-able adolescents and adults with autism often face a growing awareness of their own social difficulties (Attwood, 2000), however, many autistic adolescents report that they do have friends (Bauminger et al., 2008) and want friends (Calder, Hill, & Pellicano, 2013; Locke, Ishijima, Kasari, & London, 2010), but the quality of their friendships can be different compared to that of typical individuals, and some may have *desired* friendships but not actual ones (Bauminger & Kasari, 2000). This friendship research suggests that not all individuals with autism are devoid or completely avoidant of social contact (Sigman & Ruskin, 1999; Daniel & Billingsley, 2010). This apparent – although potentially limited – social ability may suggest that autistic individuals could be concerned about their reputation. I now review the aforementioned mechanisms of reputation management – theory of mind, social motivation, reciprocity and inhibitory control – how they manifest themselves in autism, and the predictions that they make in terms of reputation management in this population.

1.5.1. The mechanisms of reputation management in autism

Theory of mind. Problems with understanding other minds has been one of the most prominent explanations of the social difficulties in autism since Baron-Cohen et al.'s (1985) study testing whether children with autism possess a theory of other minds. Here, they used the Sally-Anne task (see section 1.3. for description), a modification of the original Maxi task (Wimmer & Perner, 1983), to test whether children with autism, alongside a group of children with Down's syndrome of similar cognitive ability and a group of younger typically developing children, could pass the task. Results showed that only children with autism had difficulty with understanding false beliefs, and Baron-Cohen et al. (1985) claimed that those with autism could not think about others' minds. Since Baron-Cohen et al.'s (1985) experiment, the ToM hypothesis has heavily influenced subsequent research. Although the theory can go some way to explaining the social difficulties in autism, it should be noted that it cannot easily explain other difficulties such as restricted and repetitive interests (Tager-Flusberg, Joseph & Folstein, 2001). Nonetheless, the theory suggests that individuals with autism do not have a theory of other minds, and as such, purportedly cannot accurately predict the behaviour of others (Yoshida, Dziobek, Kliemann, Heekerman, Friston & Dolan, 2010), deceive others (Sodian & Frith, 1992), or apply mental states to animate objects (Klin, 2000). Adults with autism, who may pass the relatively simple first-order ToM false belief tasks, often fail tests of second-order ToM, such as the Strange Stories task (Happé, 1994; White, Hill, Happé & Frith, 2009a), although many *can* pass these second-order tasks (Bowler, 1992). However, successful ToM task performance is likely underpinned by different information processing to that used by typical individuals (Begeer, Malle, Nieuwland & Keysar, 2010; Brent, Rios, Happé & Charman, 2004; Kaland, Callesen, Mølle-Nielsen, Mortensen & Smith, 2008; Lind & Bowler, 2009). Furthermore, success on false-

belief tasks depends on task conditions: structuring the false belief task as competitive increases pass rates in children with autism compared to the traditional false belief task (Peterson, Slaughter, Peterson, & Premack, 2013). In evaluating the ToM hypothesis Tager-Flusberg (2007) noted several flaws. First, some children with autism do pass ToM tasks, despite continued difficulties in everyday social cognition. Second, for typical children, many developments in social communication occur before they pass ToM tasks. Third, a number of emotional, perceptual and cognitive processes may underlie ToM ability, thus the difficulty may not lie with ToM per se but rather the underlying processes.

Recent evidence has supported the proposition that autistic individuals specifically have problems with *implicit* but not *explicit* ToM (Callenmark, Kjellin, Rönnqvist & Bölte, 2014; Dufour et al., 2013; Frith, 2004; Schuwerk, Vuori & Sodian, 2014; Senju, Southgate, White & Frith, 2009). In other words, autistic individuals may be able to pass some tests of ToM, perhaps through better language skills, compensatory strategies or experience (Happé, 1995a), but do not *automatically* consider other minds. Evidence for this suggestion has been demonstrated in studies showing that autistic adults pass traditional tests of ToM, but do not show anticipatory gaze towards the false belief location, unlike typical adults and 3-year-olds (Senju et al., 2009; Ruffman, Garnham & Rideout, 2001). Additionally, Dufour et al. (2013) found no differences in the pattern of brain activation between typical and autistic adults during a (explicit) false belief task. Missing this automatic propensity may explain why autistic individuals' social difficulties can persevere despite the ability to "work out" what others might be thinking (Frith & Frith, 2008a). In everyday life, autistic individuals may have problems detecting the cues that others display concerning

their mental states, for example, following others' gaze to engage in joint attention (Mundy, Sigman & Kasari, 1990) and the pragmatics of language (Happé, 1995b).

In terms of reputation management, if individuals with autism have fundamental problems with ToM, then they would be unable to consider what another person thought of them. Alternatively, if individuals with autism only have problems with *implicit* ToM, this may lead to the suggestion that they do not *automatically* manage their reputation, but may explicitly be able to do so. Adopting the distinction between explicit and implicit reputation management could shed light on autistic individuals' ability to manage reputation.

Social motivation. There has been a recent surge of research into social reward in autism (see Dichter et al., 2012a, for a review). This surge may be due to current uncertainty as to whether autistics have domain-general or domain-specific (i.e., social) reward processing difficulties. It should be noted that reward processing atypicalities are not specific to autism, and can be found in other conditions such as schizophrenia, obsessive compulsive disorders, and Williams syndrome (Dichter et al., 2012a). One of the most widely-used methods to test whether individuals with autism have reward processing atypicalities is to consider the underlying brain activity in comparison to typical individuals. Such an approach has, however, resulted in mixed results.

If autistic individuals have pervasive reward processing atypicalities, generalised difficulties in processing reward regardless of the type of reward would be expected. It is possible that autistic individuals may find alternative objects rewarding, especially objects that form part of a restricted or repetitive interest. This suggestion is exactly what Dichter, Felder, Green, Rittenberg, Sasson and Bodfish (2012c)

found using fMRI: autistic individuals showed diminished brain activation in response to monetary rewards, but not in response to objects that formed part of their special interests, like trains or tractors. Dichter, Richey, Rittenberg, Sabatino and Bodfish (2012b) also presented evidence for altered generalised reward processing: autistic adults showed both hypo- and hyperactivation to monetary rewards, and hyperactivation in the amygdala to social rewards. This hyperactivation was correlated with the severity of social impairments in autism. Further support for a generalised difficulty was found by Kohls et al. (2012), who showed hypoactivation of the amygdala and anterior cingulated cortex in response to both monetary and social rewards (smiling faces) during a go/no-go task (measuring inhibition) with children with autism.

Other findings, however, lean more toward a social-specific deficit. Scott-Van Zeeland, Dapretto, Ghahremani, Poldrack, and Bookheimer (2010), despite finding some diminished neural response to monetary rewards, found a greater diminished response to social rewards and additional difficulties during social learning in individuals with autism. Lin, Adolphs and Rangel (2012) also reported a specific problem with social reward learning in autism. They presented participants with slot machines, where choosing one would always lead to a negative outcome (monetary loss or an angry face), while the other would lead to a positive outcome (monetary gain or a happy face). They found that it took autistic adults longer to learn about avoiding the social negative slot machine. Additionally, McPartland et al. (2012) found no difference between typical and autistic children in their feedback-related negativity responses to monetary reward, which is observed in the brain after receiving feedback. Most studies, however, have used money as a non-social reward, but as Cascio et al. (2012) noted, many autistic individuals do not manage their own

money and may have different symbolic value toward money compared to typical individuals. Cascio et al. (2012) found that children with autism who were presented with pictures of palatable food following 4 hours of fasting showed an increased BOLD response during fMRI similar to typical children. They suggest that this finding supports the notion of a social-specific deficit, although they made no direct comparison between food and social rewards, and food may elicit a physiological response of a different quality to other types of reward.

In terms of social motivation, there is currently greater evidence to suggest that autistic individuals have problems with motivational than affective aspects of reward processing, however, this research is still in its infancy (see Kohls et al., 2012, for a review). Nonetheless, the ventral striatum is thought to be linked to motivation (Kohls et al., 2012), and many studies have consistently found diminished ventral striatum activation in autism (Dichter et al., 2012b; Dichter et al., 2012c; Scott-Van Zeeland et al., 2010; Schmitz, Rubia, van Amelsvoort, Daly, Smith & Murphy, 2008; Kohls et al., 2011), but it remains unclear whether these responses are social-specific. Objects which form part of a special interest could be more motivating than social stimuli – for example, Grelotti et al. (2005) discovered that a boy with autism who had a special interest in the cartoon Digimon showed stronger amygdala and fusiform gyrus activation to Digimon characters than to human faces. In terms of affect, research findings are inconsistent (Kohls et al., 2012).

The social motivation hypothesis suggests that social stimuli are not rewarding to individuals with autism. Dawson and colleagues (2004, 2005a, 2005b, 2008, 2012) suggested that in autism, evidence of less spontaneous orientation towards social stimuli in early life (Dawson et al., 2004; Pierce, Conant, Hazin, Stoner & Desmond, 2011) leads to the social cognitive difficulties found in autism in later life. Thus, less

sensitivity and experience with social stimuli early on in development impacts upon the emergence of social cognition (Dawson, Bernier & Ring, 2012). This idea is thought to link to reward processing, such that infants with autism may not find social stimuli rewarding and orient less towards such stimuli, which ultimately leads to fewer social learning opportunities (Chevallier, Kohls, Troiani, Brodkin & Schultz, 2012a). Chevallier et al. (2012a) construct this as diminished social motivation in autism.

Direct evidence for diminished social motivation is, however, relatively limited. Chevallier, Molesworth and Happé (2012b) used a flattery paradigm where children had the opportunity to flatter the artist of a drawing. Only typical children significantly increased their rating of the drawing when the artist was present compared to the rating they had given when the artist was not present. Chevallier et al. (2012b) deduced that since their measure of social motivation (a questionnaire measuring social anhedonia – that is, lack of social pleasure) was correlated with the amount of flattery all children showed, that children with autism did not manage their reputation due to diminished social motivation (see section 5.4. for further discussion of this experiment).

However, recent research has found that children with autism may find social stimuli just as rewarding as typical children (Ewing, Pellicano & Rhodes, 2013). Ewing et al. (2013) discovered that autistic children expended as much effort (using an effortful key press) to view faces, and were sensitive to the attractiveness of faces, similar to typical children. Additionally, Deckers, Roelofs, Muris and Rinck (2014) found that although autistic children explicitly reported a lower desire for social interaction, they implicitly indicated a social desire that was similar to, and perhaps stronger than, typical children. In their study, children could push or pull a face away or

towards them, and it is thought that those with a stronger social desire are quicker to pull faces towards them. Deckers et al. (2014) claim that this implicit desire, but reduced explicit social desire, may be a result of real-life social interactions being too complex and overwhelming for children with autism.

Although the picture of reward processing in autism is clearly complicated and currently unresolved, if autistic individuals *do* find social stimuli less rewarding, this would lead to the assumption that they may not find reputation rewarding. Further, if during development they had never found reputation rewarding, they may not be motivated to manage it in later life.

Reciprocity. Reduced social reciprocity is a diagnostic feature of autism (APA, 2013), with autistic individuals showing fewer reciprocal responses in conversation and social behaviour. Difficulties in understanding reciprocal principles has been suggested as a key challenge for enabling autistic individuals to maintain friendships (Carrington, Templeton & Papinczak, 2003b). Reciprocity is a norm followed by typical individuals (Camerer & Fehr, 2002), and autistic individuals are thought to stick rigidly to rule following (Corbett, Constantine, Hendren, Rocke, & Ozonoff, 2009; Russo, Flanagan, Iarocci, Berringer, Zelazo & Burack, 2007). Autistic children can master norms and use them to judge their own behaviour (Sterponi, 2004) and others' moral behaviour (Blair, 1996). Some authors suggest that autistic individuals are *too* focussed on following rules and norms since they tend to refer more to norm violation than any hurt caused by the violation (de Vignemont, 2007).

Fairness also contributes to reciprocal behaviour (Hoffman et al., 2008). Children with autism appear to have an explicit awareness of fairness, although they will depart from equality when instrumental gain is possible without obvious harm to

another person (Schmitz, Banerjee, Pouw, Stockmann, & Rieffe, 2014). This finding suggests that autistic children may acquire explicit knowledge of the norm of equality, but while typical children show a strong preference for equality, autistic children deviated from this preference – instead selecting more generous options rather than the equal option. Typical children may be more likely to use fairness as a reputational signal. Other researchers have suggested that typical children prefer fairness to generosity since generosity could signal favouritism, which may be perceived negatively by others (Shaw, 2013). Applying this to Schmitz et al.'s (2014) findings, autistic children may use norms, but may not do so with consideration of their reputation. As yet, there has not been any research directly examining the possible link between reciprocity and reputation management in autism.

Inhibitory control. Some researchers have proposed that autistic individuals have pervasive difficulties with executive function (Hill, 2004a, 2004b). As noted above (section 1.3), executive functions consist of a number of different components, including working memory, shifting, planning and inhibitory control (Huizinga et al., 2006). Autistic individuals have been noted to have difficulties across a number of tasks testing these various components (see Hill (2004a) and Pellicano (2012) for a review). However, this thesis focuses specifically on inhibitory control given its proposed relationship with reputation management.

The evidence for difficulties with inhibition in autism is currently mixed. Using the Stroop (1935) task (a colour-word interference task), where participants have to inhibit reading the text (e.g. "blue") and report the colour of the word instead (e.g. "red"), some authors have found autistic children perform worse on this task than typical children (Corbett et al., 2009). Other authors, however, have found no differences on this task (Lopez, Lincoln, Ozonoff & Lai, 2005; Ozonoff & Jensen,

1999). One problem with the colour-word interference task, though, is that autistic children often have language difficulties that may mean that the word does not have the same semantic connotations as it does for typical children, and is thus not distracting in this task (Adams & Jarrold, 2009).

Another task designed to measure inhibitory control is the go/no-go task. In this task, participants have to respond to "go" stimuli (e.g. triangles) and not respond to "no-go" stimuli (e.g. squares). A prepotent response is built to the "go" stimuli by presenting more of these stimuli, and participants have to inhibit this response when a "no-go" stimuli appears (Cragg & Nation, 2008). Christ, Holt, White and Green (2007) found differences between autistic and typical children on this task, with autistic children making more errors on "go" trials, but no differences in terms of the inhibitory components of the task (i.e. "no-go" trials). More recently, Adams and Jarrold (2012) demonstrated that autistic children do not have difficulty with inhibiting prepotent responses, rather, they have a specific difficulty with resistance to distracting stimuli. However, Adams and Jarrold (2012) noted that, rather than difficulties in inhibiting the interference caused by distractors, autistic individuals instead have a greater tendency to process these distractors (Remington, Swettenham, Campbell & Coleman, 2009).

Clearly, there are numerous theoretical accounts which present an inconsistent picture of inhibitory control in autism. In terms of reputation management, if autistic individuals do have difficulties with inhibition, then they may struggle to inhibit certain behaviours which may be damaging to their reputation. However, this proposed relationship has yet to be examined in autism.

1.5.2. Reputation in autism: current knowledge and future directions

Given the above discussion of the possible mechanisms of reputation management, and the evidence presented for potential difficulties in these mechanisms in autism, it follows that autistic individuals may have difficulties with reputation management. Despite some theorising on the mechanisms behind reputation management in autism, we do not know precisely which mechanism(s) is the primary cause of assumed diminished reputation management. The current section will describe the few existing studies on reputation in autism.

Social influence in autism. As previously mentioned, an increase in prosocial behaviour when others are present is a common manifestation of social influence in typical children and adults. The degree to which prosocial behaviour in individuals with autism is driven by social influence and reputation is a matter for further investigation. Evidence indicates that autistic children *are* capable of being prosocial, for example in economic games such as in the prisoner's dilemma game, whereby children are given the option to compete or cooperate with another player (Downs & Smith, 2004). Sally and Hill (2006) found few differences between typical and autistic children in cooperation in the prisoner's dilemma and other economic games such as the dictator game, where children have to decide how to divide a resource between themselves and another individual.

Furthermore, Liebal, Colombi, Rogers, Warneken, and Tomasello (2008) noted that young children with autism, like their typical counterparts, helped an experimenter to retrieve an out-of-reach object and cooperated with a partner to obtain a reward. However, Liebal et al. (2008) found that children with autism were less likely to attempt to re-engage the experimenter when she suddenly stopped interacting with them. The authors claimed that this provided evidence for Tomasello, Carpenter, Call, Behne, and Moll's (2005) shared intentionality hypothesis, which argues that

humans differ from all other species in their intention to collaborate with others toward shared goals, and that individuals with autism lack this shared intentionality. Rather than lacking in shared intentionality, though, it may be the case that autistic individuals are less likely to *appear* to share intentions due to a number of other factors reducing the propensity to do so, such as problems with joint attention and imitation (Colombi, Liebal, Tomasello, Young, Warneken & Rogers, 2009) and whether the collaborator is a friend or not (Kimhi & Bauminger-Zviely, 2012).

While it appears that individuals with autism *can* act prosocially, whether the underlying motivation for this behaviour stems from social influence is unclear. There have been few studies investigating whether individuals with autism are susceptible to social influence. Bowler and Worley (1994) examined social conformity in adults with Asperger's by replicating Asch's (1956) line judgement paradigm, whereby a group of participants have to judge which comparison line, out of three, matched a standard reference line. The majority of the group, however, were confederates who were instructed to give the wrong answer, and conformity was measured in terms of whether or not participants conformed by giving the incorrect answer too. There were no significant differences in the rates of conformity between typical adults and adults with Asperger's, although there was a trend toward less conformity in participants with Asperger's, and those with Asperger's were more likely to either stick to a strategy of conforming or not conforming at all. Bowler and Worley (1994) suggested that this tendency could reflect rigid and repetitive behaviours characteristic of autism (APA, 2013). Although there were no significant differences in conformity rates between the two groups, there may be differences between typical and autistic adults in terms of exactly *how* they are influenced by others. Further work by Maras and Bowler (2012, 2011) has noted that in the context

of eyewitness testimony, adults with autism are no more suggestible or compliant than typical adults when presented with misinformation or suggestive questioning styles. These findings may imply that autistic adults are not susceptible to social influence – but it is important to note that in this context, typical adults were just as resistant to influence.

Recently, Yafai, Verrier, and Reidy (2013) adapted Asch's (1956) line judgement paradigm to test conformity in children with autism. Children were presented with three varying lengths of animals (for example, a snake or giraffe), and they had to identify which of the three matched a comparison line. Unlike Asch's (1956) study, where one participant heard the choices of several confederates, children were simply told which line "the majority of other people" had chosen. Since children with autism were less likely to be influenced by this information, Yafai et al. (2013) concluded that autistic children were more resistant to peer pressure than typical children.

Other potential evidence that children with autism may be less susceptible to the influence of others derives from Marsh, Pearson, Ropar and Hamilton's (2013) imitation task. Over-imitating others may be a conformitive response, whereby an individual imitates a sequence of others' actions despite some of these actions being unnecessary. Marsh et al. (2013) found that children with autism were less likely to over-imitate, instead performing only the actions that were necessary to achieve an end-goal. This result may be conceptualised as a reduced tendency to conform to the actions of others.

The above studies appear to suggest that autistic individuals may be less susceptible to social influence, for example by conforming less (Marsh et al., 2013; Yafai et al.,

2013) or by having different strategies toward conformity (Bowler & Worley, 1994). However, further research in this area is clearly required to confirm this hypothesis, in particular given the lack of consistency between the studies with children (Marsh et al., 2013; Yafai et al., 2013) which note significant differences in conformity, and work with adults with autism (Bowler and Worley, 1994; Maras & Bowler, 2012, 2011) which has not found significant differences in social influence between typical and autistic adults. A few studies have aimed to test reputation management in individuals with autism, and this area of research may help to further explicate whether or not autistic individuals are susceptible to the influence of others.

Reputation management in autism. Before considering the evidence for reputation management in autism, it is necessary to elucidate whether individuals with autism are aware of reputation. Current evidence suggests that children with autism are capable of assessing the reputations of others, although they may not utilise this information during interactions. Li, Zhu, and Gummerum (2014) noted that 6 to 12-year-old children with autism could correctly identify story protagonists as morally "nice" or "naughty", but they did not exploit this knowledge when playing a prisoner's dilemma game with the protagonist. Typical children, however, tended to cooperate more with protagonists who had been judged as "nice". Previous studies have deduced that children with autism can make appropriate moral judgements when judging underlying motives for moral transgressions, although their justifications can be poorer in quality (Grant, Boucher, Riggs, & Grayson, 2005). This evidence suggests that autistic individuals could be able to make basic judgements about the reputations of others.

Two avenues of research present conflicting evidence as to whether individuals with autism can manage their reputation. On the one hand, experiments testing for the

more subtle effects of observation on behaviour suggest that autistic individuals may not manage their reputation. On the other hand, research considering autistic individual's more explicit and effortful self-presentational abilities suggest that autistic individuals *can* manage reputation.

***Implicit reputation management in autism*.** Experiments examining reputation management where reputation is only implied (e.g. through observation) suggest that autistic individuals may not manage their reputation. One of the first tests of reputation management in children with autism adopted a flattery paradigm to test whether children with autism would flatter others more when they were being observed (Chevallier et al., 2012b). To this end, children had to rate drawings twice. For one of the pictures, the experimenter claimed that she had drawn the picture herself. The crucial test was to see whether children would then increase their rating of this particular drawing in order to flatter the experimenter. Typical children enhanced their rating in this situation, and this was thought to demonstrate that they were flattering the experimenter because they were concerned about their reputation. Children with autism, however, did not enhance their rating in this situation. Chevallier et al. (2012b) interpreted their findings in terms of social motivation, that is, the autistic children were not motivated to manage their reputation, since reported social motivation was correlated with the amount of flattery shown.

Another study with autistic adults has suggested that autistic individuals do not implicitly manage their reputation. In a trust game – where participants send money to another player, which is then tripled, and the other player then decides how much they would like to return to the first player – Chiu et al. (2008) found an unusual lack of activity in the cingulate cortex during the 'self' phase of the game in adults with autism. This activity, in typical adults, was purportedly when individuals were

thinking about how much money they should allocate to the other player. Frith and Frith (2008b) speculated that this result was due to the autistic individuals not considering how their choice would look to the other – their reputation. However, this study was not designed with the aim of directly manipulating the need to manage reputation.

Izuma, Matsumoto, Camerer, and Adolphs (2011) used a charity donation task to see whether autistic adults would manage their reputation when observed by another person. While typical adults tended to donate more to charity when observed, autistic adults did not, purportedly due to a fundamental deficit in ToM, although Izuma et al. (2011) did not measure ToM (see Chapter Two for further interpretation of their results). Frith and Frith (2011) further proposed that the lack of reputation management seen in Izuma et al.'s (2011) study could be thought of as a lack of hypocrisy. In other words, reputation management – acting in a way to satisfy the opinions of others and improve one's own image – is manipulative and hypocritical. Perhaps typical individuals are *too* concerned with their reputation, which results in reputation management even in generally non-consequential experimental conditions, while autistic individuals appear to have a venerated honesty.

***Explicit reputation management in autism*.** Reputation management may be possible for autistic individuals when reputation itself is more explicit. One area of research, which directly consolidates with explicit reputation management, examines self-presentation in autism. Self-presentation can be thought of as any attempts individuals use to promote or present the self in a desired light (Banaji & Prentice, 1994). The findings from self-presentation research in autism tend to conflict with the notion that autistic individuals cannot manage reputation (Izuma et al., 2011). Begeer, Banerjee, Lunenburg, Meerum Terwogt, Stegge, and Rieffe (2008) asked

typical and autistic children to describe themselves twice – once with no incentive, and once when they were told they could be chosen to win some prizes. Therefore, children had opportunity to gain a prize by self-promoting and expressing why they deserved the prize. Results showed that autistic children were capable of self-promotion, by increasing positive statements about the self to gain the prize. However, autistic children were less strategic than typical children, for example by reporting fewer aspects of self that related to their game-playing skills. Schereen, Begeer, Banerjee, Meerum Terwogt, and Koot (2010) replicated and extended Begeer et al.'s (2008) study by giving children the opportunity to direct their self-promotion for specific audiences (for example, toward a new child in their class who liked animals). Once more, children with autism could self-promote, but were less strategic and less flexible in adapting to the identity of the audience. The authors suggested that autistic children may be less likely to self-promote due to a reduced tendency to be dishonest, and therefore they are less likely to exaggerate or lie about the self in order to self-promote. Furthermore, children with autism do appear to understand self-presentational display rules (such as knowing which emotion to express in certain situations) but are less effective in using them (Barbaro & Dissanayake, 2007). Self-presentation research appears to suggest that children with autism have an ability to present the self in certain ways, but are less skilled in doing so.

Research into friendship in autism (e.g. Bauminger & Kasari, 2000; Bauminger et al., 2008; Locke et al., 2010) shows that many autistic individuals report a desire for friendship which could link to an explicit awareness of reputation, since many autistic individuals appear to be concerned about their friendships and want to have friends. The quality of autistic individual's friendships appears to be different to

those of typical individuals, which could impact on reputation management. For example, Petrina, Carter and Stephenson (2014) reviewed 24 studies on the nature of friendships in cognitively-able children with autism. This review found that autistic children had fewer friendships, struggled to give complete definitions of friendships, experienced less reciprocity in friendships, and had lower frequency of contact with their friends. It may be the case that autistic individuals do find some or many social relationships rewarding, but lack the social abilities to maintain these friendships, with autistic individuals having an awareness of their reputation but difficulties in effectively managing their reputation. However, there is a paucity of research directly examining this issue.

1.6. The current thesis

This thesis first aimed to test whether individuals with autism manage their reputation, and second, to identify the mechanisms behind reputation management in individuals with and without autism.

To examine these aims, this thesis considered reputation management in adults, children and adolescents with and without autism. First, Chapter Two examined whether autistic adults could manage their reputation under certain circumstances. This study was motivated by Izuma et al.'s (2011) experiment, which claimed that autistic adults could not manage their reputation as they did not donate more to charity when observed, unlike typical adults. However, Izuma et al.'s (2011) study could not rule out alternative explanations for their results – namely, whether autistic adults *could* manage reputation in different, more motivating, situations. Chapters Three to Six were conducted concurrently. Chapter Three considered the development of explicit and implicit reputation management in typical children, to

inform our understanding of reputation management in typical development. Chapter Four subsequently examined the potential mechanisms (theory of mind, social motivation, expectations of reciprocity and inhibitory control) underlying reputation management in typical development, given the lack of research directly testing the contribution of these mechanisms. Chapter Five intended to elucidate whether children with autism manage their reputation, by testing the proposed forms of explicit and implicit reputation management. Chapter Six examined the suggested mechanisms of reputation management in autistic children. Finally, Chapter Seven looked in further detail at reputation management in adolescents with autism by adopting qualitative methods to examine this under-researched area. Adolescence is a time of particular interest when considering reputation management, since friendships tend to become of upmost importance (Blakemore & Mills, 2014) and autistic individuals become more aware of their social differences (Stoddart, 1999). Qualitative methods enabled a detailed thematic analysis of autistic adolescents' potential concerns for reputation. Overall, this thesis intends to contribute to knowledge of reputation management, and more widely to social influence, in a range of individuals both with and without autism.

Chapter Two

Reputation management in adults with autism

This study has been published as Cage, E., Pellicano, E., Shah, P., & Bird, G. (2013). Reputation management: evidence for ability but reduced propensity in Autism. *Autism Research, 6*(5), 433-442.

2.1. Introduction

In Chapter One, I argued that reputation is an important motivator of prosocial behaviour and trigger for social influence. In this study, reputation management was investigated by considering whether autistic adults were able to manage their reputation when motivated to do so.

2.1.1. Reputation management in adults with autism

The first study to test directly reputation management in autistic adults was conducted by Izuma et al. (2011). In their study, participants played a variation of the dictator game (Kahneman, Knetsch & Thaler, 1986) in which they could decide if they wanted to accept losses of money from an endowment, when it meant that a charity could gain some money. Crucially, they did this task once when alone and once when observed. They were observed by a confederate, posed as a technician, who noted down the participant's decisions after an error occurred on the computer. Izuma et al. (2011) found that when observed, typical adults tended to accept more losses, therefore donating more to charity, presumably to manage reputation. Adults with autism, however, did not change their behaviour when observed. Izuma et al. (2011) thus concluded that autistic adults were insensitive to reputation.

To engage effectively in reputation management, we need to be able to represent what other people think of us (Amodio & Frith, 2006), an ability typically referred to as theory of mind (ToM). Some theorists argue that the social and communicative difficulties shown by individuals with autism are caused by fundamental problems in ToM (Baron-Cohen et al., 1985). If autistic people have problems with ToM, and reputation management relies on ToM, it follows that those with autism may be less able to manage how they are viewed in the eyes of others. Izuma et al. (2011)

adopted the stance that adults with autism have difficulties with ToM that resulted in them being unable to manage their reputation. Adults with autism in Izuma et al.'s (2011) study were aware that they were being observed, since Izuma et al. (2011) also conducted a social facilitation experiment which demonstrated that when observed, performance on a simple task for both autistic and typical participants was facilitated, in line with social facilitation theory (Zajonc, 1965).

However, there are a number of alternative explanations which could explain Izuma et al.'s (2011) results. Izuma et al. (2011) themselves suggested that autistic people *can* represent reputation, but are not intrinsically motivated to do so due to decreased sensitivity to social reward. The social motivation hypothesis of autism suggests that social stimuli, including reputation, are not motivating to individuals with autism (Chevallier et al., 2012a). It is therefore possible that while adults with autism might have the ability to manage reputation, the propensity to engage in reputation management is reduced due to diminished social motivation.

Alternatively, autistic adults could find reputation motivating only under certain circumstances. For example, they may be particularly motivated to have a good reputation with specific individuals. Research has suggested that some people with autism desire friendships: cognitively-able autistic children report that although they have a lower frequency and quality of social interactions, they would like to take part in more satisfying interactions but do not know how (Bauminger, Cory, & Agam, 2003). Adults with autism also report this discrepancy between problems with initiating social interactions and the longing for greater intimacy (Muller, Schuler, & Yates, 2008). It may be the case that autistic adults do not instinctively know how to manage their reputation, despite a desire to impress certain individuals with whom they would like to obtain friendships.

Furthermore, an important aspect of reputation management that has not previously been examined in autism is the distinction between implicit and explicit reputation management (Shaw et al., 2013). An individual could implicitly manage their reputation without conscious awareness that they are doing so, while explicit reputation management occurs when an individual is consciously aware that their reputation is at stake, and deliberate effort is made to manage reputation. Considering the putative explicit-implicit distinction in autism, evidence suggests that cognitively-able autistic adults come to possess an explicit but not implicit ToM (Frith, 2004). Evidence for this distinction comes from Senju et al.'s (2009) eye-tracking study. They found that although adults with autism could give the correct answers to (explicit) false belief tasks, they failed to show anticipatory gaze to the false belief location, indicating no implicit awareness of false belief. This finding suggests that difficulties with ToM may arise specifically in its implicit or automatic use for individuals with autism. Due to its hypothesized reliance on ToM (Izuma, 2012), perhaps reputation management is more likely to occur for autistic individuals when it is explicitly clear that they *should* be managing their reputation.

Finally, the reciprocal aspect of reputation management also requires consideration and has yet to be examined experimentally in autism. Direct reciprocity can be defined as a contingent response to another's behaviour (Falk & Fischbacher, 2006). Indirect reciprocity occurs when a third party (person C) is aware of one's previous actions (for example, whether person A helped person B), and subsequently rewards or punishes the other for their previous behaviour (Engelmann & Fischbacher, 2009). Indirect reciprocity is therefore reputation-based: if others know of your reputation, they can utilise this information to decide how they treat you. Reciprocity is an important mechanism for cooperation, by helping to promote non-selfishness and a

norm of reciprocal behaviour (Nowak & Sigmund, 2005). Therefore, situations in which one is aware of the importance of reciprocity for one's reputation could lead to a change in behaviour to take advantage of reciprocal principles, particularly if one expects others to reciprocate.

Although Izuma et al.'s (2011) study has served to stimulate further research in this area, alternative explanations – as identified in Chapter One, such as the distinction between explicit and implicit reputation management and reciprocity – have not been examined, therefore these explanations must be tested in order to develop our understanding of reputation management in autism.

2.1.2. The current study

The current study aimed to test whether cognitively-able autistic adults could manage their reputation, in particular when it was more explicitly clear that reputation should be managed. Therefore, this study provided a potentially motivating situation in which some participants were led to believe that the observer could later reciprocate with them. Izuma et al.'s (2011) experiment was replicated by asking typical and autistic participants to donate to charity when alone and when observed. Critically, the experiment was extended by (1) also asking them to donate to a person and (2) by manipulating the extent to which participants were motivated to make a donation. To this end, half of all participants were presented with a situation in which the person they were donating to was the observer (a confederate), in the knowledge that this observer would be donating to them next (motivation condition). Participants were therefore motivated to take into account this person's opinion, believing the person watching not only could see how generous they were being, but also had the power to reciprocate (i.e., respond to the participant's offer) and be generous in return. The

remaining half believed the observer was simply watching the procedure (no motivation condition). Data were also gathered from questionnaire measures which may relate to the propensity to manage reputation, such as social anxiety and social desirability. An individual's desire for social approval or any anxiety caused by social situations could impact upon the amount of reputation management that takes place. Finally, this study also directly replicated the social facilitation experiment carried out by Izuma et al. (2011). Izuma et al. (2011) found that for autistic adults, like their typical counterparts, performance in a simple task was improved by observation.

Following Izuma et al. (2011), it was predicted that in the no motivation condition, when reputation is only implied through observation, typical adults, but not those with autism, would donate more in an attempt to manage their reputation – particularly when donating to charity as this recipient would be seen as more deserving (Eckel & Grossman, 1996). Any behaviour change in the motivation condition allows for us to disentangle the two competing hypotheses for the lack of reputation management seen in autistic adults in Izuma et al. (2011). If they do lack the ability to think about others' minds then, even when motivated to do so, they should not increase their donations to the observer. Alternatively, if the supposed inability to engage in reputation management is instead better characterised as a reduced propensity to do so, then providing a situation in which individuals could gain more rewards by maximising principles of reciprocity should result in an instrumental increase in donations to the observer. In this way, reputation management becomes instrumental for gaining a good outcome by encouraging reciprocity in others.

2.2. Method

2.2.1. Participants

Thirty-nine male participants took part in this study: 19 cognitively-able autistic adults and 20 typical adults. Two additional typical adults participated but were excluded from analyses for guessing that the observer was a confederate, and one additional autistic adult also participated but was excluded for not fully understanding the task. Participants within each group were randomly assigned into either "motivation" or "no motivation" conditions (see below), yielding four groups. These groups were matched for chronological age and intellectual functioning, as measured by the Wechsler Abbreviated Scale of Intelligence - II (WASI-II; Wechsler, 2011) or the Wechsler Adult Intelligence Scale (WAIS; Wechsler, 1997) (Table 1). A 2 (group; autistic or typical) x 2 (condition; no motivation or motivation) between-participants analysis of variance (ANOVA) confirmed that there were no significant group differences in Full-Scale IQ, $F(1,35) = 1.97$, $p=.17$, $\eta_p^2=.05$, differences between conditions, $F(1, 35) =.94$, $p=.34$, $\eta_p^2=.03$, and no significant interactions (all ps$>.15$). There were also no significant differences in age between groups, $F(1,35) = 1.59$, $p=.22$, $\eta_p^2 =.04$, or between conditions, $F(1, 35) = 2.12$, $p=.15$, $\eta_p^2 =.06$.

All participants with autism had received independent clinical diagnoses of an autism spectrum condition according to DSM-IV-TR (APA, 2000) and met algorithm criteria for autism or Autism Spectrum Disorder on the Autism Diagnostic Observational Schedule – Generic (ADOS-G; Lord et al., 2000; Table 1). Autistic participants were recruited through a participant database held at the Institute of Cognitive Neuroscience at University College London. Typical participants were recruited through volunteer databases at Birkbeck College and the Institute of Education, London, and the group comprised a range of occupations.

Table 1.

Descriptive statistics for typical and autistic participants in motivation and no motivation conditions.

		Typical		Autism	
		No motivation	**Motivation**	**No motivation**	**Motivation**
n		10	10	9	10
Chronological age	*M* (*SD*)	27.9 (7.4)	34.7 (9.6)	34.2 (7.6)	34.7 (5.6)
	Range	21 – 41	21 – 48	25 – 48	29 – 48
Full Scale IQ	*M* (*SD*)	102.2 (13.9)	106.1 (17.1)	108.2 (14.8)	113.9 (15.5)
	Range	73 – 118	85 – 135	87 – 128	77 – 132
Verbal IQ	*M* (*SD*)	106.0 (12.0)	105.6 (17.7)	107.63 (14.1)	113.22 (20.7)
	Range	86 – 125	88 – 138	85 – 124	74 – 138
Perceptual IQ	*M* (*SD*)	97.4 (15.2)	105.1 (14.5)	101.43 (14.1)	111.25 (8.40)
	Range	64 – 116	86 – 130	84 – 125	99 – 122
ADOS score	*M* (*SD*)	-	-	10.1 (2.4)	9.0 (1.8)
	Range	-	-	7 – 15	7 – 11

Notes. Intelligence Quotient (IQ) measured with the WASI-II or WAIS. Autism Diagnostic Observation Schedule (ADOS) – higher scores indicate greater severity of symptoms of autism.

All participants gave written informed consent prior to participation and were fully debriefed on its completion. Ethical approval was gained from the Faculty of Policy and Society's Research Ethics Committee at the Institute of Education, London.

2.2.2. The donation task

The donation task was designed to measure reputation management by testing whether typical and autistic adults were sensitive to observation, by changing their behaviour by donating more when they were observed. This task had a mixed design. The independent variables in this study were group (autism or typical), condition (motivation or no motivation), observer (absence and presence) and recipient (charity

and person). The dependent variables of interest were the total number of accepted donations to (1) the charity and (2) the person.

In the donation task, participants played a variation of the dictator game, following Izuma et al. (2011). At the beginning of the task, participants were told that they could receive £40 of real money for participating. The choice they had to make was whether they were willing to *lose* some of this money, so a charity or a person could *gain* some money. Participants were told that one trial would be chosen at random at the end of the sessions, and their decision on that trial would take effect. Participants completed this task once when alone (absence) and once when observed (presence), the order of which was counterbalanced across participants.

Motivation and no motivation conditions. Following Izuma et al. (2011), participants were told that they could donate to the charity UNICEF, but unlike Izuma et al. (2011), they could also donate to a person, which they were told was another participant. When completing the task alone, all participants were told that the person's name was a participant who had completed the task previously, and if they decided to donate money to them, the experimenter would contact this participant to tell them that they had been given money. Crucially, we extended Izuma et al.'s (2011) study to manipulate the motivation to donate between participants. Participants in the 'no motivation' condition were watched by the observer (a confederate), who was simply observing the task procedure before she (allegedly) participated. In this condition, participants again believed they were donating to a person who had previously completed the task. For those in the 'motivation' condition, participants were told that the person to whom they could donate was the observer (the same confederate) currently observing them completing the task. In earshot of the participant, the confederate was told that when she

participated next, she would have the opportunity to donate to the current participant. Thus, those in the motivation condition were led to believe that the individual observing them, and to whom they were donating money, would have the opportunity to donate to them in the near future.

Materials and general procedure. The pay-off matrix for losses and gains can be seen in Figure 1. Participants could lose between £0 and £16, while the recipient (a charity or a person) could gain between £0 and £32. This pay-off matrix was the same as that used by Izuma et al. (2011), except the gain to recipients was doubled. The amount the recipient could gain was increased because (1) it becomes more logical to donate to the recipient as greater returns can be expected if they reciprocate, and (2) this modification reduced the number of redundant trials where it made no sense to donate (i.e., where the participant's loss was greater than the recipient's gain; red cells in Figure 1).

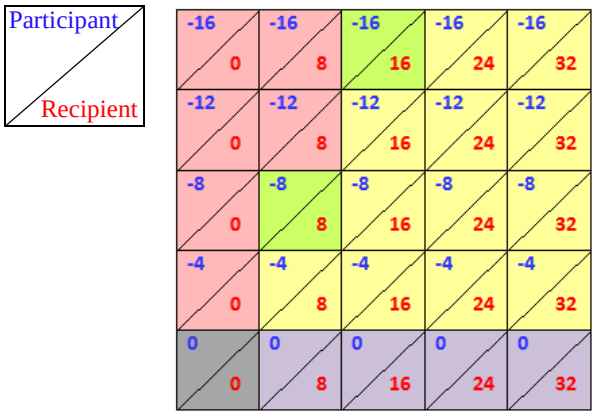


Figure 1. Pay-off matrix in the donation task. Each individual cell (25 in total) shows the amount the participant could lose (top left of cell) and the recipient could gain (bottom right). Red cells reflect trials during which the participant could lose more than the recipient could gain, and yellow cells are where the recipient's gain is larger than the participant's loss. Green cells denote equal gain to loss and purple cells are

where the participant lost nothing. The grey cell, where participants would lose nothing and the recipient would gain nothing, was excluded from analyses.

Each cell in the pay-off matrix was tested twice for each recipient (i.e., twice for the person and twice for charity: 50 trials each). These 100 trials were randomised, and whether participants were donating to a person or to charity was randomised within each session. Since each cell was tested more than once, to avoid memory of choices each cell had a random amount (range £0.10 - £0.30) added or subtracted from both participant loss and recipient gain. If losses and gains were equal (2 green cells), the random amount added or subtracted was the same, and if the amount was zero, nothing was subtracted or added.

Participants had to decide to *accept* or *reject* the trial they saw on screen using a keyboard press (Figure 2). Once the choice was made, the selected option was highlighted in red for 1000 ms before proceeding to the next trial. Their choice was highlighted in all conditions, but this emphasis was particularly important in the presence condition to ensure that it would be clearly visible to the person observing. Following Izuma et al. (2011), trials on which participants would lose nothing and the recipient would gain nothing were excluded from analyses (4 trials; grey cells in Figure 1), as decisions to accept or reject could be random. It was stressed to participants that only one trial would be selected randomly at the end of the experiment, the choice made on that trial would take effect, and the participant would lose the specified amount of money if they had accepted that trial. Participants who rejected all of the trials, including those where they would be losing nothing, were excluded, as this suggested they did not understand the task (n = 1; autism group).

Figure 2. Example trial in donation task: Participants saw money they could lose from £40, and money a charity or person could gain. They had the option to accept or reject the choice and their decision was highlighted for 1000 ms.

Participants completed 10 practice trials at the beginning of the experiment to familiarise them with the procedure. MATLAB (The Mathworks, Massachusetts, USA) and Cogent (LON, FIL, & ICN, London, UK) were used to display the stimuli. The stimuli were shown on a non-reflective 42" screen and the confederate sat approximately 1 metre behind the participant, to their left.

Each participant completed the task twice on the same day, one session in which participants completed the task alone (absence) and a second in which they were observed by another person (presence). The order of these sessions was counterbalanced across participants. Half of the participants were randomly assigned to the motivation condition, and the other half to the no motivation condition, as described above. Participants completed other experiments during the break between sessions (60 – 90 minutes). Questionnaires relating to the experiment were administered at the end of the second session.

Each participant met Experimenter 1 (E1) at a designated location before arriving at the laboratory. Upon meeting, E1 explained they were waiting for another participant (the confederate). When the confederate arrived, E1 introduced the participant and the confederate to each other and brought them to the lab, where together they were presented with the task instructions. For participants who completed the presence condition first, E1 explained that the confederate was going to watch them complete the task before she (allegedly) completed the task herself. After the participant completed the task, E1 introduced another experimenter (E2), who accompanied the confederate to another room to complete unrelated tasks with them, while the participant performed unrelated tasks before completing the donation task again when alone. For participants who completed the absence condition first, E2 entered at the beginning of the experiment and immediately took the confederate with her to 'complete some different tasks'. When the confederate returned for the second session, E1 explained she had been doing different tasks and missed the procedure of the donation task, so was going to watch the current participant perform the task.

In the second session, regardless of whether the observer was present, all participants were told that the task was being repeated to collect as much data as possible. E1 left the room before the task began in each session.

2.2.3. Theory of mind measures

A number of tasks were used to measure autistic participants' ability to read and reason about others' minds. Data on 16 autistic participants' explicit ToM skills had been collected previously on three tasks: the Ice Cream Story (Perner & Wimmer, 1985), the Penny Hiding task (Baron-Cohen, 1992) and the Strange Stories task (Happé, 1994).

In the Ice Cream Story (Perner & Wimmer, 1985), participants were told a story whereby John and Mary went to the park and decided to buy ice cream. However, Mary had forgotten her money, so she left John to fetch some money from home. In the meantime, the ice cream vendor informed John that he was going move from the park to the church. As the ice cream vendor travelled past Mary's house, he also informed her that he was moving to the church. Later, Mary went to buy an ice cream. While she was gone, John visited Mary's house, and her mother told him that Mary had gone to buy the ice cream. Participants were then asked where John thinks Mary will be. To pass, participants must give the correct answer is that he believes she will have gone to the park. Participants therefore were scored as either having passed (score of 1) or failed (score of 0) this task.

The penny hiding task (Baron-Cohen, 1992) is considered a measure of deception, with the ability to deceive assumed to require an understanding of others' minds. In this task, participants scored one point for successfully hiding a coin from the experimenter in one of their hands. Participants did not score any points if they failed to deceive the experimenter, for example, by revealing the penny before the experimenter had guessed, or failing to hide both hands when originally hiding the coin. Participants completed six trials where they had the opportunity to hide the coin yielding a maximum possible score of 6 points.

Happé's (1994) Strange Stories task presents complex stories considering various aspects of ToM such as double bluff, irony and sarcasm. The subset of 8 mental state stories selected by White et al. (2009a) was used in this study. Participants were asked several questions about the stories and are scored 0 points for incorrect, 1 point for partially correct, and 2 points for fully correct answers, yielding a maximum

possible score of 16. A detailed description of the Strange Stories task can be found in section 4.2.3.

2.2.4. Continuous performance task: social facilitation

The continuous performance task directly replicated that used by Izuma et al. (2011) to measure social facilitation, that is, to test whether participant's performance on an easy task was facilitated by the presence of an observer. All participants completed this task. The independent variables were group (autism or typical) and observer (absence and presence). D prime (d') scores calculated by calculating the difference between the z-transforms of hits and false alarms (d' = z(H) – z(F); Keating, 2005). A higher d' score indicated that the signal was better detected.

In this task, single randomised letters of the alphabet appeared repeatedly on-screen for 200 ms, with a 1000 ms inter-stimulus interval (Figure 3). Letters appeared in white on a black background. The target letter X appeared in 26% of trials (156 trials). MATLAB (The Mathworks, Massachusetts, USA) and Cogent (LON, FIL, & ICN, London, UK) were used to display the stimuli.

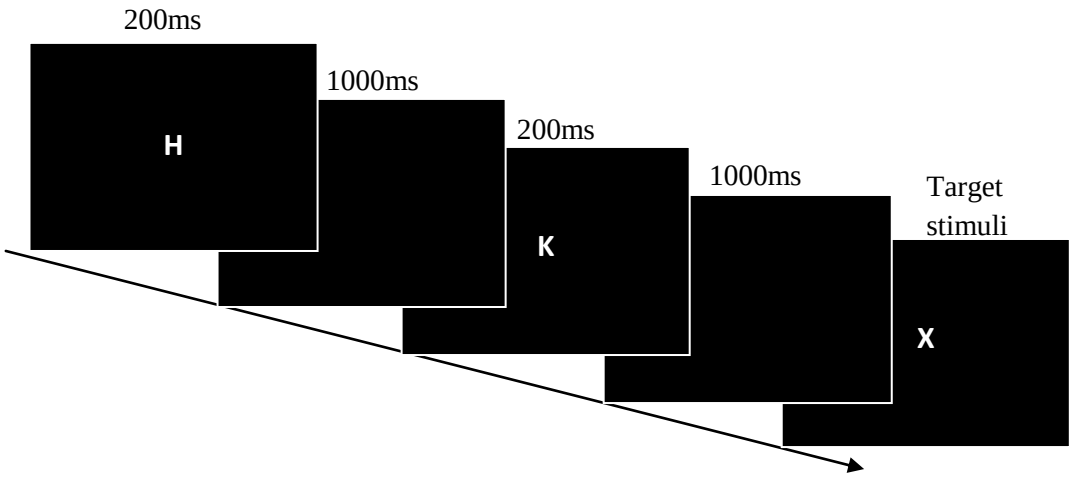


Figure 3. Trial structure in the continuous performance task.

Before the task began, participants were instructed to press the spacebar every time they saw the letter X appear on screen. The task was completed twice, in two separate sessions, once when observed (presence) and once when alone (absence). There were 600 trials in each session, with each session lasting around 12 minutes. The observer was the same confederate used in the donation task, who observed the continuous performance task either prior to or following the donation task, the order of which was counterbalanced. The confederate's presence was justified by saying that she was watching the task to see how it was performed before she completed the task herself.

2.2.5. Questionnaires

Bespoke Likert-scale questions. Several Likert-scale questions were used to confirm that there were no differences in attitudes toward donation behaviour or the observer between the two groups of participants. Replicating Izuma et al. (2011), following the experimental session participants were asked several questions regarding the experiment, including (1) how important they believed the mission of UNICEF to be and (2) how socially desirable they believed donating to UNICEF to be, both on a 7-point scale. This 7-point scale consisted of "not at all important/socially desirable" (1) to "very important/socially desirable" (7). Participants were also asked to rate how socially desirable they believed donating money to other people was, on the same 7-point scale. Other questions elicited participants' attitudes about the observer: whether they thought the person watching them was friendly, observant, and how much they wanted the observer to like them on a 5 point scale, from '1' ("not at all friendly/observant") to '5' ("very friendly/observant"). All participants were asked whether they believed their behaviour changed when they were being observed, and by how much, which they

rated on a four-point scale, with '1' indicating "I was not aware of the person", '2' "I was aware of the person but did not change in any way", '3' "I changed a little" and '4' "I changed a lot". Participants were also asked to elaborate on the ways in which they thought their behaviour changed.

Marlowe-Crowne social desirability scale. The Marlowe-Crowne social desirability scale (Crowne & Marlowe, 1960) was used to measure participants' need for social approval. Participants had to state whether they believed 33 statements to be true or false in relation to themselves, for example, "I never hesitate to go out of my way to help someone in trouble". Higher scores on this scale are thought to relate to higher need for social approval, with a maximum score of 33. Theoretically, participants who report a tendency to act in socially desirable ways may also have a stronger desire to possess a good reputation amongst other people, and will therefore be more likely to manage their reputation.

Social Interaction Anxiety Scale (SIAS). The SIAS (Mattick & Clarke, 1998) was used to measure participants' anxiety towards social interactions. In response to 19 different statements, such as "I find it difficult to mix comfortably with the people I work with", participants had to indicate the degree to which the statements applied to themselves, on a 5-point scale from '0' ("not at all") to '4' ("extremely"). Higher scores reflect higher reported levels of social interaction anxiety, and the maximum possible score was 76. Participants who are more socially anxious may be more conscious (and anxious about) what others think of their reputation, thus they may attempt to manage their reputation more.

Social Phobia Scale (SPS). The SPS was developed by Mattick and Clarke (1998) to measure fears of scrutiny during every day activities, for example, "I get nervous that

people are staring at me as I walk down the street". Participants considered 20 different statements which could be rated on a 5-point scale from '0' ("not at all") to '4' ("extremely") in relation to how true the statement was of the individual. Higher scores relate to higher levels of social phobia, with a maximum possible score of 80. Social phobia and social interaction anxiety differ in that social phobia involves fear of being observed during certain activities, while social anxiety involves distress during social interactions (Mattick & Clarke, 1998). As social phobia specifically involves a fear of being observed, this was important to take into account given this study involved direct observation of the participant.

Reciprocity questionnaire. Since the motivation condition related to the principle of reciprocity (such that the observer could reciprocate the offers made to her when she played the game), the Personal Norm of Reciprocity questionnaire (Perugini, Gallucci, Presaghi, & Ercolani, 2003) was used with autistic participants to confirm that they understood reciprocity. This questionnaire is designed to measure three aspects of reciprocity: positive reciprocity (the likelihood of reacting and paying attention to positive reciprocal behaviours, such as sharing), negative reciprocity (the likelihood of reacting and paying attention to negative reciprocal behaviours, such as revenge), and beliefs in reciprocity (belief in the use of reciprocal behaviour, for example, "to help somebody is the best policy to be certain s/he will help you in the future"). Participants rated 27 statements on a 7-point scale as to how true the statements were of themselves, from '1' ("not at all true for me") to '7' ("very true for me"). Scores for each of the three aspects of reciprocity (positive, negative, and beliefs) were then averaged (maximum score 7), with higher scores indicating stronger reactions to positive and negative reciprocity and higher beliefs in reciprocity.

To further test understanding of reciprocity, all participants were asked direct questions about sharing money with others and their expectations of reciprocity, namely "if *you* were given £10, and shared £5 of this with another person, how much would they share with you if they were then given £10?", and "if *another person* was given £10, and shared £5 of this with you, how much would you share with them if you were then given £10?".

Attitudes toward money. To ensure there were no differences between groups in their attitude toward money, given that the current study used money as a reward in the donation task, the Money Attitudes Scale was used (Yamauchi & Templer, 1982). This questionnaire includes 29 questions pertaining to people's attitudes to money, rated on a 7-point scale from '1' ("always") to '7' ("never"). Higher scores (maximum raw score = 203) on this scale indicate more negative attitudes toward money. Participants were also asked to rate on a 4-point scale, from '1' ("not at all") to '4' ("very much") how much they needed and wanted extra money, with higher scores indicating higher need and desire for money (maximum score of 4 for each).

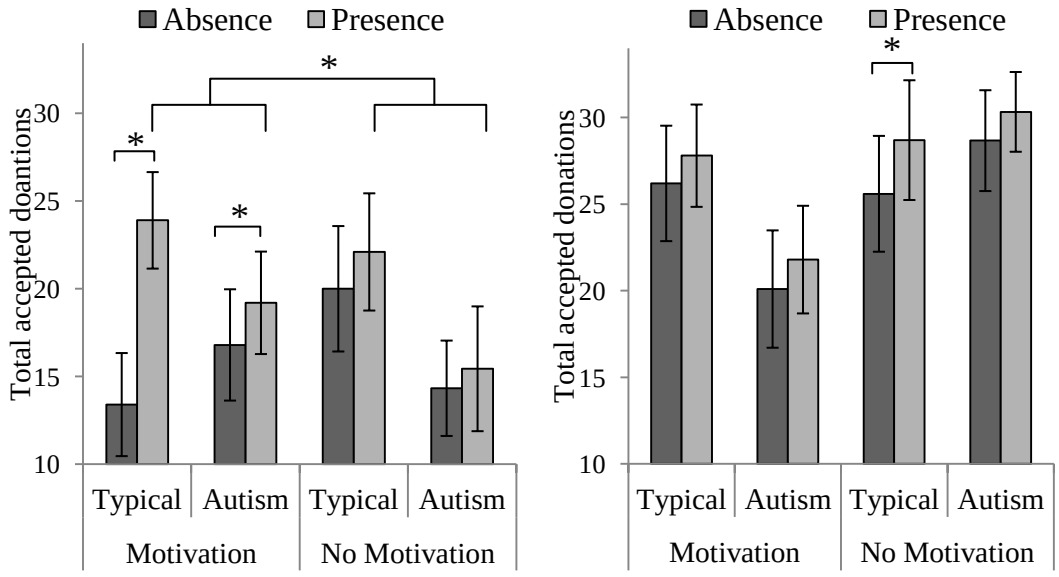
2.3. Results

Results for each of the tasks (the donation task and the continuous performance task) and the theory of mind and questionnaire measures are now considered in turn. Data were analysed in terms of group differences across the various measures.

2.3.1. The donation task

Figure 4 shows the total accepted donations to the recipients (charity or person), when alone and when observed, for typical and autistic individuals in either the motivation or no motivation condition. To test for the effects of these variables on

donation decisions, a 2 (group; autism or typical) x 2 (observer; absence and presence) x 2 (condition; motivation or no motivation) x 2 (recipient; charity and person) mixed design ANOVA was performed on the number of accepted donations. There was a significant main effect of observer, $F(1, 35) = 24.8$, $p<.001$, $\eta_p^2 =.42$, and a main effect of recipient, $F(1,35) = 35.3$, $p<.001$, $\eta_p^2 =.50$. There was a significant 2-way observer x group interaction, $F(1, 35) = 4.61$, $p=.039$, $\eta_p^2 =.12$. There were also significant 3-way interactions between observer, recipient and condition, $F(1, 35) = 7.92$, $p=.008$, $\eta_p^2 =.19$, and recipient, group and condition, $F(1, 35) = 6.67$, $p=.014$, $\eta_p^2 =.16$. These interactions were qualified by a significant 4-way interaction between observer, recipient, condition and group, $F(1, 35) = 4.76$, $p=.036$, $\eta_p^2 =.12$. All other main effects and interactions were non-significant (*p*s>.06). An additional ANCOVA controlling for age, IQ, and session order did not alter the pattern of results.

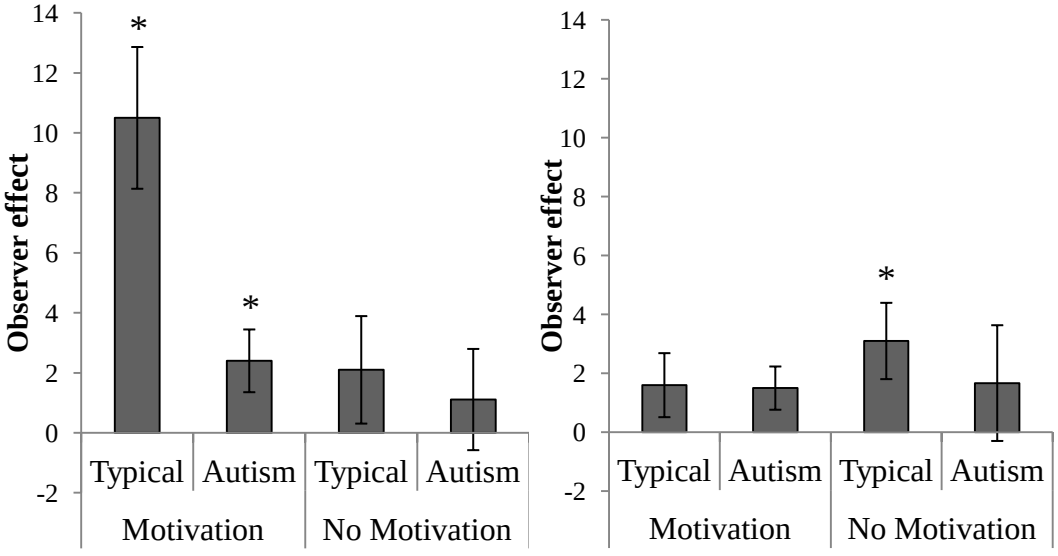


A. Donations to Person B. Donations to charity

Figure 4. Mean total donations by typical and autistic individuals to the person (A) and to charity (B) in absence and presence conditions, for motivation and no

motivation groups. Asterisks and bar groupings indicate significant differences between groups. Error bars indicate +/- one standard error.

To determine the source of the significant 4-way interaction, the difference score between the presence and absence conditions was calculated (i.e., the "observer effect", Figure 5), and a 2 (group; autism or typical) x 2 (condition; motivation or no motivation) x 2 (recipient; person or charity) mixed ANOVA was conducted on the observer effect. This analysis revealed significant main effects of recipient, $F(1, 35) = 4.31$, $p=.045$, $\eta_p^2=.11$, and group, $F(1, 35) = 4.77$, $p=.036$, $\eta_p^2=.12$, and a significant interaction between recipient and condition, $F(1,35) = 8.18$, $p=.007$, $\eta_p^2=.19$. The 3-way interaction between recipient, group and condition was also significant, $F(1, 35) = 4.52$, $p=.041$, $\eta_p^2=.11$. All other main effects and interactions were not significant (all ps>.11).



A. Person observer effect B. Charity observer effect

Figure 5. Observer effects (difference score between presence and absence conditions) on person (A) and charity (B) donations for each group (typical or autism) and condition (no motivation or motivation). Asterisks indicate observer effects significantly different from zero. Error bars indicate +/- one standard error.

Planned comparisons were used to examine the three-way interaction between recipient, group and condition. Independent t-tests produced a highly significant Levene's test (p=.001), therefore equal variances were not assumed. There was a significant difference in the person observer effect between typical and autistic participants in the motivation condition, $t(18) = 3.14$, p=.008, r=.59. There was also a significant difference in the person observer effect between motivation and no motivation conditions for typical adults, $t(18) = 2.83$, p=.011, r=.55. All other planned comparisons between groups and conditions were not significant (all ps>.39).

One-sample t-tests were used to determine whether the observer effects in each group were significantly different from zero, indicating a reliable change in behaviour. When donating to the person (Figure 5, panel A), typical individuals in the motivation condition showed an observer effect significantly different from zero, $t(9) = 4.44$, p=.002, r=.83. Adults with autism in the motivation condition also showed an observer effect significantly different from zero, $t(9) = 2.30$, p=.047, r=.61. When donating to charity (Figure 5, panel B), only typical individuals in the no motivation condition showed an observer effect significantly different from zero, $t(9) = 2.39$, p=.040, r=.62. All other effects were not significant (all ps>.07). Notably, when donating to charity in the no motivation condition – the closest replication of the original Izuma et al. (2011) study – adults with autism did not show an observer effect that was significantly different from zero, $t(8) = .85$, p=.42, r=.29.

Following Izuma et al. (2011), to test whether participants had similar preferences for donations, I used linear regression to assess whether the proportion of accepted donations in the absence condition depended on the amount participant's were losing

and the amount the recipient was gaining. Results showed that for all groups, loss to the participant significantly predicted the proportion of accepted donations (all *p*s<.001), such that all participants were more willing to accept small losses. Considering the amount that the recipient could gain, all groups showed normal preferences for accepting donations (all *p*s<.007), such that as recipient gain increased, the proportion of accepted donations increased. Figure 6 below visually demonstrates the proportion of accepted donations to the person and to charity in the absence condition, across all of the possible groups. This figure supports the above findings that participants were more willing to accept small losses, particularly when the other was set to gain more.

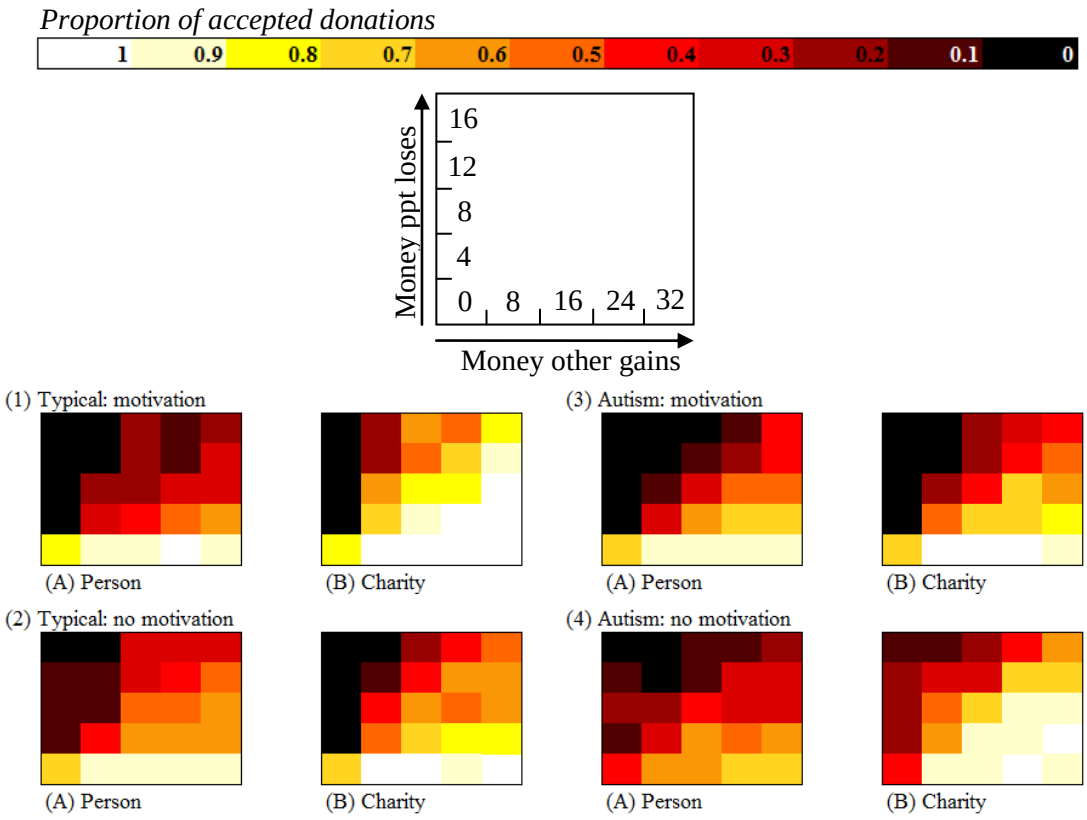


Figure 6. Proportions of accepted donations to the person and to charity in the absence condition for each group and condition. White indicates a high proportion of accepted donations and black indicates a low proportion of accepted donations.

Izuma et al. (2011) also theorised that those who donated little when they were alone would show a greater increase in donations when watched – as they would be more motivated to enhance their reputation – while individuals who already donated a high amount when alone would not increase their donations a great deal. However, I failed to replicate this result, with no significant correlations between donations in the absence condition and the observer effect for any group (all *p*s>.15).

2.3.2. Theory of mind

Data from 16 autistic participants' ToM skills were available from their participation in previous research (Table 2), of which 8 participants had received the motivation condition, and the remaining 8 received the no motivation condition. T-tests confirmed there were no significant differences between the two conditions for any ToM measure (all *p*s>.37).

Table 2.

Measures of theory of mind completed by autistic participants, with percentage of participants giving correct responses or mean scores.

Measure		Result (*n* = 16)
Ice Cream Story	Percentage passing	73%
Penny hiding (max = 6)	*M* (*SD*)	4.93 (1.28)
	Range	2 – 6
Strange Stories task (max = 16)	*M* (*SD*)	11.5 (2.45)
	Range	6 – 14

Table 3 displays the correlations between the observer effects and the second-order ToM measures. There were no significant correlations between ToM performance on any of the second order tasks and the person or charity observer effects (all ps>.07).

Table 3.

Correlations between the observer effects and theory of mind measures for autistic participants.

		Penny hiding	Ice Cream Story	Strange Stories
Person observer effect	*r*	-.29	-.19	.31
	p	.32	.51	.24
Charity observer effect	*r*	-.14	-.48	-.42
	p	.62	.07	.11

To test whether these measures could predict the observer effect, a linear regression with Strange Stories, penny hiding, and ice cream story scores as predictors was conducted, controlling for individual differences in age and IQ. For the person observer effect, the model was a poor fit for the data, $F(5,14) = 1.64$, $p = .24$. Only scores on the Strange Stories task were marginally significant in predicting the person observer effect within this model, $t = 2.21$, $\beta = .69$, $p = .054$, with higher Strange Stories scores relating to larger person observer effects. For the charity observer effect, no predictors were significant (all *ps*>.24).

2.3.3. Continuous performance task (CPT).

Mean hit and false alarm rates for both groups can be seen below in Table 4. The high level of accuracy is indicative of a ceiling effect for both groups. These rates were used to calculate participants' d' score.

Table 4.

Mean proportion and standard deviations of hit and false alarm rates during the Continuous Performance Task, according to group (typical or autism) and condition (absence and presence).

		Group			
		Typical		Autism	
		Absence	Presence	Absence	Presence
Hits	*M* (*SD*)	99.01% (1.31)	99.55% (.76)	99.02% (1.63)	98.95% (1.44)
	Range	96 – 100%	97 – 100%	94 – 100%	94 – 100%
False alarms	*M* (*SD*)	.45% (.73)	.36% (.31)	.70% (1.42)	.63% (.93)
	Range	0 – 3%	0 – 1%	0 – 6%	0 – 3%

Figure 7 shows that when observed, the typical group had a mean d' score of 5.40 (*SD* =.50), and when they were alone the mean d' was 5.19 (*SD* = .62). Autistic individuals had a d' score of 5.14 (*SD* =.66) when observed and 5.20 (*SD* =.74) when they were alone.

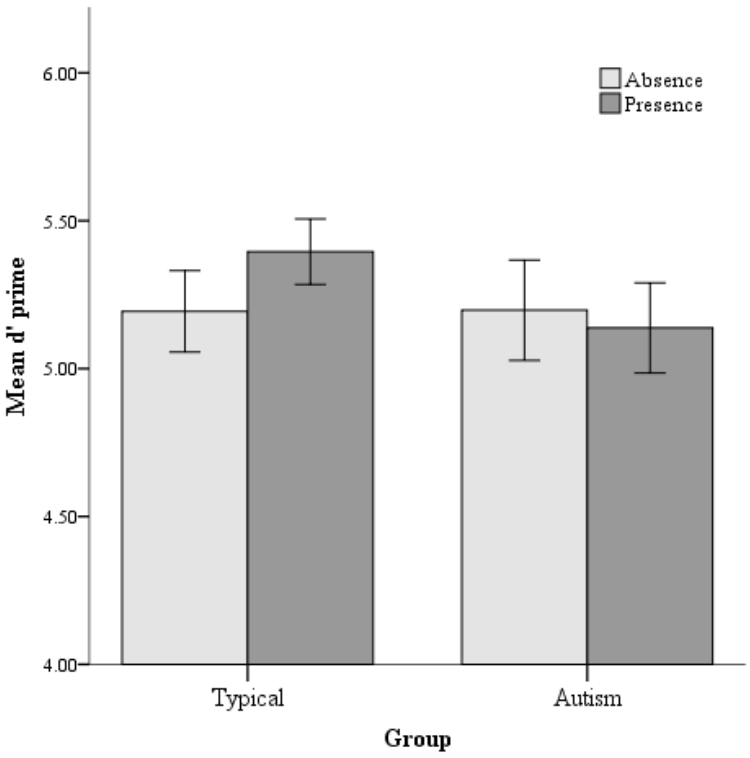


Figure 7. Mean d' scores for autistic and typical individuals when alone (absence) and when observed (presence).

A 2 (observer) x 2 (group) x 2 (session order) mixed ANOVA was performed on d' scores. This analysis revealed no significant main effects or interactions, with the exception of a significant interaction between observer and session order, $F(1,31) = 5.66$, $p=.024$, $\eta_p^2 = .15$. This interaction was driven by performance being worse in the second session regardless of the absence or presence of an observer or group.

2.3.4. Questionnaire measures

Participants' attitudes towards donating to charity and to other people were measured. To test for any significant differences on these measures between group and condition, 2 (group: autism or typical) x 2 (condition: motivation or no motivation) between-participants ANOVA were used for each scaled question. This revealed no significant main effects or interactions between group and condition for questions concerning the importance of UNICEF's mission (all *p*s>.10), the social

desirability of donating to UNICEF (all *p*s>.43) and the social desirability of donating money to other people (all *p*s>.15). Considering attitudes toward the observer, rated on a 5-point scale, the same 2 x 2 between-participants ANOVA revealed no significant main effects or interactions for when participants were asked how observant they thought the observer was (all *p*s>.07[2]) and how much they wanted the observer to like them (all *p*s>.24). However, when asked how friendly they thought the observer to be, there was a significant main effect of condition, $F(1,38) = 4.82$, $p=.035$, $\eta_p^2 = .12$, with those in the no motivation condition (M = 3.95, SD =.78) rating her as more friendly than those in the motivation condition (M = 3.40, SD =.82). When asked whether participants felt that their behaviour had changed when observed (on a 4-point scale), the 2 x 2 between-participants ANOVA revealed a significant main effect of condition, $F(1,38) = 4.79$, $p=.035$, $\eta_p^2 = .12$. Accordingly, those in the motivation condition reported that their behaviour had changed more when observed (M = 2.80, SD =.83) than those in the no motivation condition (M = 2.26, SD = .65).

Several questionnaire measures of constructs thought to impact upon reputation management were also administered to all participants. Table 5 shows descriptive statistics for each measure according to group and notes significant group differences. Due to the small sample size, and as there were no differences between conditions (all *p*s>.09), results are collapsed across conditions (motivation and no motivation) to increase the power of the results.

[2] Adults with autism reported that the observer was observant, compared to typical individuals, $t(37) = 1.92$, $p=.063$, $r=.30$.

Table 5.

Results of questionnaire measures according to group, with significant differences between groups highlighted with asterisks.

Measure		Typical	Autism
Marlowe-Crowne social desirability scale	*M* (*SD*)	15.50 (4.90)	12.21 (5.90)
	Range	5 – 23	2 – 21
Social phobia scale	*M* (*SD*)	15.05 (8.92)	19.63 (11.04)
	Range	4 – 33	2 – 49
Social interaction anxiety scale	*M* (*SD*)	16.05 (11.02)	30.11 (16.41)*
	Range	3 – 43	1 – 62

Note. *$p<.01$.

Notably, there were significant group differences in social interaction anxiety – with autistic participants scoring significantly higher on this scale. Since social interaction anxiety could impact upon the propensity for reputation management, I correlated this measure with the observer effects for person and charity donations, separately for typical and autistic individuals. Results showed that only for typical individuals did social interaction anxiety positively correlate with the person observer effect, $r(18) = .514$, $p = .021$ (Figure 8). In the continuous performance task, the questionnaire measures did not significantly correlate with the observer effect on d' scores.

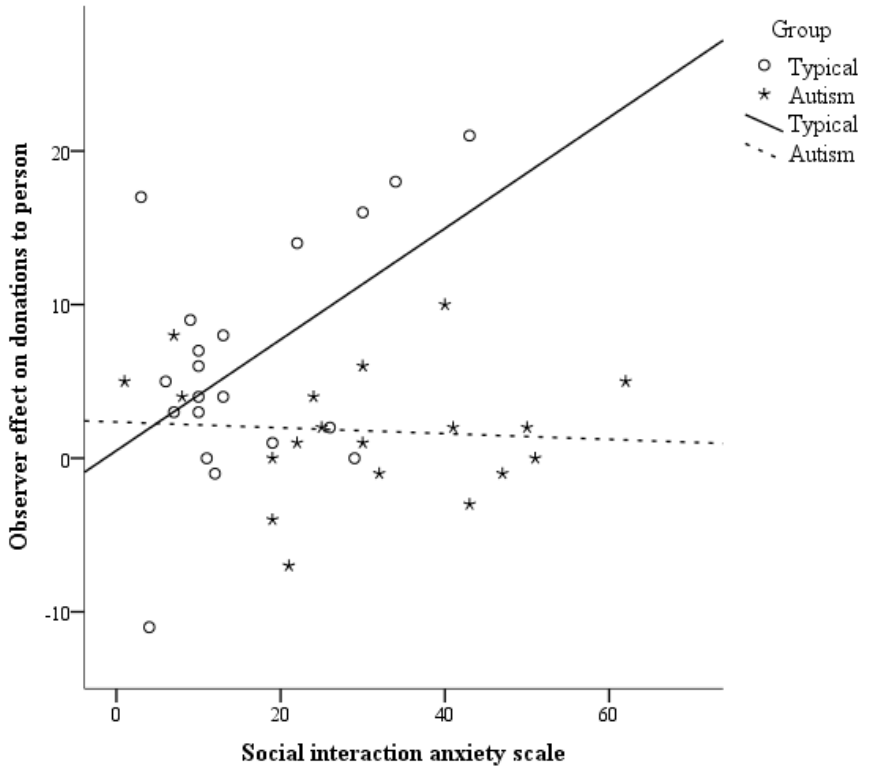


Figure 8. Scatterplot showing the relationship between social interaction anxiety and person observer effect.

Since social interaction anxiety could explain some of the variance in predicting the observer effects, I therefore conducted the previous donation task 4-way ANOVA controlling for this variable. Results showed that compared to the original 4-way ANOVA (section 2.3.1), the main effects of observer and recipient were no longer significant (both *p*s>.07). The two-way, three-way interactions and four-way interactions remained unchanged, suggesting that the main findings remain even after controlling for social anxiety.

Self reports. In answer to the question "if your behaviour changed, how or in what way do you believe it changed", 11 typical participants (motivation condition: *n* = 5; no motivation condition: *n* = 6) and 12 autistic participants (motivation condition: *n* = 9; no motivation condition: *n* = 3) reported that their behaviour had changed and

provided a written response (Table 6). Four themes were identified from the responses of participants with and without autism. First, many (typical n = 5, autism n = 2) reported awareness that they were donating more when being observed. Second, a few participants (typical n = 2, autism n = 3) expressed reputational concerns over how they appeared to the observer. Some participants (typical n = 2, autism n = 4) also commented that they felt that they were thinking or concentrating more when they were being observed. Finally, some participants (typical n = 1, autism n = 2) also reported discomfort when being observed. Table 6 below shows each participant's observer effects, how much they believed their behaviour changed on a 4-point scale ('1' ("I was unaware I was being watched"), '2' ("I was aware of the person but I did not change"), '3' ("I changed a little") and '4' ("I changed a lot")), and their self-report if they believed their behaviour had changed. Chi-square showed that there was no difference between autistic and typical participants in their Likert-scale report of how much they believed their behaviour had changed, $\chi^2(3) = 2.52$, p=.47, φ =.25.

Table 6.

Self-reports of behaviour change from autistic and typical participants, alongside observer effects for person and charity conditions.

Group: condition	Observer effect		How much did your behaviour change?	*How* did your behaviour change? (Self-report)
	Person	Charity		
Autism: No motivation	1	6	Aware of person but did not change	N/A
	8	10	I was unaware I was being watched	N/A
	-3	2	I changed a little	I might have been more inclined to donate to the stranger, even though they are a complete stranger, when the cost to me was comparatively small in relation to the reward they were getting.
	4	4	Aware of person but did not change	N/A
	5	0	Aware of person but did not change	N/A
	-7	5	I changed a little	I was trying to think a bit harder and concentrate more.
	6	0	I changed a little	I felt a bit as though I had to be an example of what needed to be done and to show the procedure of the tasks.
	0	-1	Aware of person but did not change	N/A
	-4	-11	Aware of person but did not change	N/A
Autism: motivation	10	4	I changed a little	When I did not know the person I was less willing to lose money to give to them than if I knew the person and was being watched by them.
	0	-1	I changed a little	Being watched made me nervous. I look her opinion into account. The more stingy she perceived me to be the less likely she would be generous to me when doing the test with my name.
	2	-1	Aware of person but did not change	N/A
	-1	1	Aware of person but did not change	It did not change, but I did feel a little more at ease and comfortable, and a little less awkward when I wasn't being watched.
	5	5	I changed a little	I think I pretended to be more generous than I really am while I was being watched. But to be honest, the sums of money involved would not make much difference in my life (but also the sums involved would be fairly trivial for UNICEF, which is a charity I do not have strong feelings about).
	4	4	I changed a little	Was more mindful that I needed to donate
	1	0	I changed a little	I'd make comments to her about the task. Also I thought out loud more.
	-1	-1	Aware of person but did not change	Very slightly if at all.
	2	1	I changed a lot	Slightly more generous.
	2	3	Aware of person but did not change	Thinking before giving this person money as it was like giving them an open cheque

Group: condition	Observer effect		How much did your behaviour change?	*How* did your behaviour change? (Self-report)
	Person	Charity		
Typical: No motivation	3	-2	I changed a little	I hope my behaviour did not change but I was aware of taking more time to settle into the decision making process.
	6	5	I was unaware I was being watched	N/A
	4	1	Aware of person but did not change	N/A
	9	6	I changed a little	Because of the effect of being judged or being labelled as not very generous.
	8	12	I changed a little	I was more concentrating on what answer to choose
	0	1	Aware of person but did not change	Did not change mainly because I thought that they were merely observing how to do the experiment, answers may have changed if someone more official was watching.
	-1	-1	Aware of person but did not change	Even though I didn't change, I felt slightly uncomfortable being watched, as thought my decisions might be perceived of as unkind.
	-11	5	Aware of person but did not change	N/A
	1	3	I changed a little	Donated more perhaps.
	2	1	Aware of person but did not change	N/A
Typical: motivation	21	0	Aware of person but did not change	N/A
	17	-1	I changed a lot	I donated more to the person watching me.
	3	5	Aware of person but did not change	N/A
	0	1	Aware of person but did not change	N/A
	7	2	I changed a lot	I felt more inclined to donate money to the observer.
	14	9	Aware of person but did not change	N/A
	16	1	I changed a lot	When being watched I was concerned about how my donating to the individual would be interpreted. I adopted the same strategy in both conditions about donating to UNICEF.
	4	3	Aware of person but did not change	N/A
	18	-1	I changed a lot	Would donate money to her in some instances but not all. It did not change in respect to donating to UNICEF.
	5	-3	I changed a little	Sometimes I preferred to donate her more money than I used to before.

Reciprocity questionnaire. Responses from 16 autistic participants and 10 typical participants were obtained for a number of questions concerning reciprocity. Due to a poor response from the typical adults (50%), results are collapsed across motivation and no motivation groups for subsequent analyses. Data from 16 autistic participants' attitudes towards the norm of reciprocation was compared to the means obtained from Perugini et al.'s (2003) normative sample of 951 participants. This analysis revealed no significant difference in negative or positive reciprocity (both *ps*>.12), but there was a significant difference in beliefs about reciprocity, $t(15) = 5.79$, $p<.001$, $r=.83$, such that the adults with autism had higher beliefs in reciprocation ($M = 4.76$, $SD = .56$) than the norm ($M = 3.96$), as shown in Table 7 below.

Table 7.

Autistic participants mean (SD) responses to the Personal norm of reciprocity questionnaire as compared to the norm reported in Perugini et al. (2003).

	Autism (n = 16)	Norm
Beliefs in reciprocity	4.76 (.56)*	3.96
Positive reciprocity	5.28 (.72)	4.99
Negative reciprocity	3.84 (.99)	3.60

Note. *significantly different to Perugini et al.'s (2003) norm ($p < .001$)

In answer to the question "if you were given £10, and decided to share half of this (£5) with another person, and then this same person was given £10, how much of that do you think they would share with you?", all typical participants said they expected to receive £5 from the other person, however, the mean amount autistic participants believed they would receive was £3.83 ($SD = 2.08$) – an amount significantly lower than that reported by the typical group, $t(23) = 2.17$, $p=.048$, $r=.41$. When participants were asked the reverse question, "if another person was given £10, and decided to share half of this (£5) with you, and then you were given £10, how much

would you then share with that same person?", typical participants reported they would share £4.80 (*SD* = .63) and autistic participants £4.88 (*SD* = 1.15) on average. There was no significant difference between groups in answer to this question, $t(24) = .19$, $p=.85$, $r=.04$.

Attitudes toward money. Considering attitudes toward money, there was no difference between typical (*n = 10, M* = 145.89, *SD* = 13.01) and autistic participants (*n* = 16, *M* = 142.87, *SD* = 16.92) on the Money Attitude Scale (Yamauchi & Templer, 1982), $t(22) = .46$, $p=.65$, $r=.10$. On a 4-point scale, participants were also asked how much they wanted and how much they needed extra money. Again, there were no significant differences between groups in answer to either of these questions (all *p*s>.21).

2.4. Discussion

The current study intended to test whether adults with autism could manage their reputation under certain conditions. The findings suggest that, contradictory to Izuma et al.'s (2011) interpretation, autistic adults *do* have the ability to manage their reputation. However, there may be several factors that reduce the likelihood that reputation management actually occurs in autism.

2.4.1. The donation task

The donation task aimed to test whether autistic adults could manage their reputation when motivated to do so, in order to explain purportedly absent reputation management in these individuals. Three main findings require explanation. First, unlike typical adults, adults with autism did not manage their reputation by increasing donations to charity when watched. Second, when provided with motivation, autistic adults *did* demonstrate an observer effect when donating to the

person. Third, the magnitude of this observer effect was significantly attenuated relative to the effect shown by typical adults. These findings suggest that autistic individuals have the ability to show a degree of reputation management, under conditions in which it is beneficial to think about another person's opinion.

The charity data replicated those obtained by Izuma et al. (2011): typical adults donated more to charity when watched, while adults with autism did not. Two candidate explanations for this effect were previously advanced: (1) that those with autism are unable to manage their reputation because of ToM difficulties or (2) that those with autism do not find reputation rewarding and thus do not attempt to manage their reputation. The additional manipulation of participants' motivation enabled an attempt to distinguish these competing explanations. Here, I found that when autistic participants were in a situation where they could utilise reciprocal principles to gain a financial reward, they significantly increased their donations when watched. These results suggest that the autistic adults may have used *explicit* ToM ability in the motivation condition to anticipate that the observer could judge their behaviour in terms of reciprocity. A specific difficulty with *implicit* ToM (Frith, 2004; Senju et al., 2009) might be the primary driver of the lack of an observer effect when donating to charity. It is worth noting that the suggested relationship between explicit and implicit distinctions within social cognition differs to results in other areas of cognition. For example, autistic adults tend to show a pattern of intact implicit but impaired explicit performance on measures of memory (Gardiner, Bowler & Grice, 2003) and learning (Brown, Aczel, Jiménez, Kaufman & Plaisted Grant, 2010). Further work is needed to examine the explicit/implicit distinction across a variety of domains and test its applicability to different clinical populations (Mottron, Dawson & Soulières, 2008).

In this study, an explicit situation appeared to make autistic people more aware of their behaviour, and as such, led to attempts to manage reputation. Evidence of this explicit awareness is supported by the questionnaire measures, which revealed that all participants in the motivation condition were aware that their behaviour had changed, and this was further supported by participants' self-reports (see section 2.4.3. for further discussion). This finding is consistent with recent research showing that adults with autism can use abstract social rules (in the current experiment, the norm of reciprocation) during social interactions (Baez et al., 2012). A degree of reputation management may be possible when autistic people are explicitly aware they should be thinking about what another person thinks – thus, the *ability* to manage reputation may be unaffected in autism.

Nonetheless, the degree to which the autistic participants changed their behaviour when observed, even when motivated, was significantly attenuated compared to the typical participants. There are at least two possible explanations for this attenuation, either (1) difficulties with reward processing or (2) further difficulties with ToM. First, if the monetary incentive to manage reputation is less rewarding for those with autism (Kohls et al. 2012), we would expect participants to make less effort to obtain money as a reward. Yet the autistic participants showed no differences in their desire, understanding, or need for money, implying that they found money a rewarding and motivating stimulus (for similar findings see Lin, Rangel, & Adolphs, 2012; Damiano, Aloi, Treadway, Bodfish & Dichter, 2012). Furthermore, analysis of donation behaviour in the absence condition suggested that both groups donated in similar ways when they were unobserved.

Perhaps, then, specific difficulties in autism with *social* reward processing may lead to a lessened propensity to engage in reputation management. The social motivation

hypothesis of autism (Dawson, 2008; Chevallier et al., 2012a) proposes that the pervasive social difficulties in autism are caused by a primary deficit in social motivation, which leads to secondary difficulties in social cognition. In the current study, it is unclear whether the motivational attenuation was observed specifically in response to social rewards – given that the motivation was not purely social – or whether individuals with autism have more pervasive reward processing difficulties. It is possible that social motivation links to an individual's (both typical and those with autism) propensity to actually engage in reputation management – those who are more socially motivated being more likely to attempt reputation management. The current study, however, did not directly test this hypothesis. Future research could test the impact of an explicit social reputation condition, for example, by telling participants the observer was watching to rate people's generosity. Such a study would benefit from a larger sample size than that used in the current study which may have biased effect sizes (Levine & Hullett, 2002) and prohibited subtle effects from being observed.

Aside from reward processing difficulties, the attenuation in the person observer effect may reflect further problems in ToM. Indeed, there was some evidence for the idea that those with better ToM, as measured by the Strange Stories task (Happé, 1994; White et al., 2009a), showed larger observer effects when donating to the person, suggesting better ability to think about others' thoughts could lend itself to reputation management. However, caution is advised in interpreting this finding, first, as analyses suggested that the model was not a good fit to the data, and second since the predictive power of the Strange Stories task was not specific to the motivation condition, where reputation management had been noted. It is therefore unclear exactly how much ToM contributes to reputation management.

Further, while autistic participants may realise that they *should* donate more to the observer as she could later reciprocate, they may not fully realise that the degree of reciprocity is determined by their own behaviour. Such difficulties would be consistent with the reported difficulties experienced by adults with autism in predicting and influencing the behaviour of others (Yoshida et al., 2010). In the current study, participants in the motivation condition had to predict that the observer would engage in a tit-for-tat strategy, but ToM problems in some adults with autism might have limited the degree to which this behaviour was predicted. Therefore, it seems that some degree of explicit ToM ability would benefit reputation management.

Furthermore, the above findings are consistent with research into self-presentation in childhood (Begeer et al., 2008; Scheeren, Begeer, Banerjee, Meerum Terwogt & Koot, 2010). Such studies have shown that cognitively-able children with autism *do* show evidence of the ability to self-promote for a reward, although they do so less effectively and with less sensitivity to their audience than typical children. These results could also be conceptualised as evidence for ability to manage reputation (since self-promotion is a key method in managing one's reputation), but reduced propensity to do so. In support of this idea, Scheeren et al. (2010) suggested that children with autism show less flexibility in their self-presentational ability possibly due to the desire to stick with following rules – such as avoiding lying, even when lying could improve one's reputation.

2.4.2. Continuous performance task

The current study also attempted to replicate Izuma et al.'s (2011) finding that both typical and autistic participants would be socially facilitated during an easy task, the

continuous performance task (CPT). However, this result was not replicated, with no social facilitation found in either group. This null finding, however, is likely to be driven by ceiling effects, as all participants were highly accurate during the task. Performance was also affected by session order such that participants performed better in the first session regardless of whether they were observed or alone.

Social facilitation, as a social psychological phenomenon, has obtained mixed findings. It is thought to be one of the first effects discovered in social psychology, by Triplett in 1898 (see section 1.2) but was not conceptualised until 67 years later (Zajonc, 1965). Zajonc (1965) considered social facilitation to be the increased emission of dominant responses in the presence of another person or audience. Recent findings suggest that video game performance (Bowman et al., 2013) and visual search task efficiency (Miyazaki, 2013) can be facilitated by an audience. However, research into social facilitation has also found null findings (for example, Manstead & Semin, 1980). Guerin (1993) reports that for 18 published studies examining social facilitation, only 11 find evidence of mere presence facilitating task performance. Clearly, although social facilitation remains to be an important concept, the null results in the current study are not surprising given the mixed findings of social facilitation across past research.

Furthermore, as participants in both groups *were* affected by the presence of an observer in some conditions in the donation task, this finding suggests that autistic people *can* be affected by the presence of another person. Consolidating the CPT and donation tasks could support Cottrell et al.'s (1968) suggestion that something more than just the mere presence of another person is required to produce social facilitation effects. Specifically, Cottrell et al. (1968) postulated that a learned expectation of evaluation from others causes a change in behaviour when observed.

In the current study, concerns for evaluation were likely to be heightened in the motivation condition of the donation task, but the mere presence of an observer during the CPT task was not enough to provide strong evidence for social facilitation.

2.4.3. Relationships between reputation management and questionnaire measures

This study also took into account a number of questionnaire measures that may impact upon behaviour in the donation and CPT tasks. First, both groups had similar attitudes toward the charity UNICEF to whom they were donating, and toward the observer. There were also no significant differences between groups on the Marlowe-Crowne social desirability scale (Crowne & Marlowe, 1960), and there were no group differences on the social phobia scale (Mattick & Clarke, 1998). These findings confirm that both autistic and typical participants in our sample had similar desire for social approval and neither feared observation.

However, social interaction anxiety differed significantly between the groups. Specifically, autistic individuals scored significantly higher on social interaction anxiety, supporting previous reports of increased anxiety in this group (Gillott and Standen, 2007; Tantam, 2000; White, Oswald, Ollendick & Scahill, 2009b). However, the results suggested that for typical individuals, social interaction anxiety was positively correlated with the person observer effect. Social interaction anxiety specifically considers individual's anxiety toward social situations (Mattick & Clarke, 1998). In the current study, participants were presented with the situation of being observed by another person whom participants believed was going to play the game after them, and they may have anticipated that they would have to later interact

with this individual. This anticipation could therefore have heightened social anxiety and caused an increase in donations to the person to avoid potentially negative interaction in the future.

I also tested whether the attenuated observer effect found in autistic individuals could be explained by any alternative factors. Specifically, I examined whether the autistic participants understood the principle of reciprocity. Understanding of reciprocity was important in the current task, as participants may increase their donations in the motivation condition due to expected reciprocation from the observer. The results revealed some interesting differences in understanding and expectations of reciprocity in the autistic participants.

First, I tested whether participants with autism understood and believed in the norm of reciprocation. Interestingly, the results revealed that the participants with autism had unusually *high* beliefs in the norm of reciprocation, perhaps due to more rigidity in following rules (APA, 2013; Bowler & Worley, 1994; Scheeren et al., 2010) and/or an explicit learning of the norm of reciprocation. However, when participants were asked how much they would expect to receive in return from another person whom they had shared £5 of £10 with, autistic participants only expected to receive £3.83 on average, whilst all typical participants anticipated they would receive £5 in return. Autistic participants understood the question, since when asked the reverse, "if another person was given £10, and decided to share half of this with you (£5), and then you were given £10, how much would you then share with that same person?", there was no difference between typical and autistic participants. It seems that the autistic adults did not necessarily expect others to reciprocate with them, despite reporting that they would reciprocate themselves.

Difficulties in being able to plan and predict how others act towards them may be exacerbated by autistic adults' low expectations of reciprocation, which may be based on their experiences with others. Perugini and Galluci (2001) believe that reciprocity occurs for two reasons: because it is an internalised standard and because people are concerned about what others think (see also Burger et al., 2009). The current results imply that adults with autism reciprocate because it is a social norm that they adhere to, rather than to gain something for their own reputation. Experience and expectations of others' behaviour may be an important component of reputation management, and expectations of reciprocity have been shown to mediate trust behaviour (Tanis & Postmes, 2005) and determine behaviour in economic games (Hoffman, McCabe & Smith, 1996). Our experiences with others are an important means of learning exactly what to predict from other people (Frith & Frith, 2006). Autistic individuals are more likely to have limited experiences with others and may have more negative experiences, such as bullying (Roekel, Scholte, & Didden, 2010). Arguably, an individual's propensity for reputation management may be lessened if one does not expect a good reputation in the eyes of others to be reciprocated with social rewards in the future. Indeed, in the motivation condition, there is no guarantee that the observer *will* reciprocate the participant's offers when she subsequently completes the task. If autistic adults have an expectation that others do not tend to reciprocate their actions, this could lessen the degree of reputation management.

Finally, self-reports were collected from participants regarding how they thought their behaviour changed during the donation task. Several themes to which both groups referred were noted: awareness of observation, reputational concerns, increased concentration, and discomfort when being observed. In line with the

suggestion that autistic adults have the ability to manage reputation, several autistic participants reported that they were changing their behaviour when observed, for example, *"I think I pretended to be more generous than I really am while I was being watched"*. Comparatively, one of the typical participants in the motivation condition reported that *"when I was watched I was concerned about how my donating to the individual would be interpreted"*. Although limited by a small sample size, the qualitative data corroborate the quantitative findings of reputation management ability in autistic individuals.

2.4.4. Limitations and future directions

The current study was limited by a small sample size. Effect sizes throughout were relatively small, limiting the statistical power of the study. Caution in interpretation is therefore recommended, and future studies should attempt to replicate the current findings to confirm whether autistic adults do have the ability to manage reputation. The autistic participants were also highly verbal. Given the highly heterogeneous nature of autism (APA, 2013), it is likely this sample represents only the highly cognitively-able end of the autism spectrum. Future studies should take into account whether the ability to manage reputation is limited to this end of the spectrum, since more able autistic adults may be able to utilise verbal ability or have learnt some reputation management skills.

Economic games, such as the dictator game, may not be an ecologically valid measure of social influence. On the one hand, the dictator game does not reflect real-life social interaction, where reputation management occurs in a wide range of situations from the workplace to the internet (Tennie et al., 2010). On the other hand, economic games are an excellent experimental means for testing social influence,

precisely because people do not act in an economically-rational way (Camerer & Fehr, 2002). The dictator game has also been used across a variety of different cultural contexts which suggests it has good reliability (Thomae, Zeitlyn, Griffiths & Van Vugt, 2012). Whether or not the dictator game produces a limited or perhaps over-estimated picture of reputation management, it currently serves as a useful controlled experimental situation to test for reputation management.

Future research, nonetheless, should attempt to go beyond economic games. Indeed, as mentioned above, self-presentation research (e.g. Begeer et al., 2008; Schereen et al., 2010) has shown that children with autism can self-promote, an important element of reputation management. It would be interesting to examine other situations in which reputation management may occur for autistic adults. For example, research suggests that the internet is being utilised by autistic individuals to foster social relationships and aid social communication (Benford, 2008; Burke, Kraut, & Williams, 2010). Autistic individuals may be concerned how they are perceived by those they have developed online friendships with, but less concerned with how a stranger would view them. Indeed, in the current study increasing the identity of the observer – from a technician in Izuma et al.'s (2011) study to another participant in the current study – appeared to produce observer effects for autistic adults. Typical individuals, conversely, seem to be inherently sensitive to their reputation in a multitude situations regardless of the identity of the person, or even if a real person is present (e.g. Nettle et al., 2012a; Oda et al., 2011).

These results suggest that adults with autism do have the ability to manage reputation but a reduced propensity to do so. Frith and Frith (2011) proposed that adults with autism are "free of hypocrisy" since they did not manage their reputation whilst donating to charity (Izuma et al., 2011). Although this finding was replicated, autistic

individuals also showed a degree of reputation management in the motivation condition. It is likely that the typical adults in the motivation condition were motivated more by self-interest rather than by subtle attempts to manage reputation. Autistic adults, meanwhile, remain free of hypocrisy, as they attempt to utilise a norm of reciprocation, but do so out of believing in reciprocation itself, rather than to manipulate others.

In sum, the current study found that reputation management was possible for autistic adults, but the propensity of reputation management occurring was reduced. These results suggest that autistic adults do not have a deficit when it comes to managing reputation: rather, they are less likely to manage reputation due to a number of possible factors. Appreciating what may lead autistic individuals to have different social perception is of great importance, and this thesis will consider some of the developmental factors that may underlie reputation management skill in subsequent chapters. However, surprisingly little is known about the development of reputation management in typical individuals – as shown in the current study, typical adults appear to be very sensitive to their reputation. Chapters Three and Four test the development of reputation management and its possible underlying mechanisms. Given that the current study suggested that there may be a distinction between implicit and explicit forms of reputation management, subsequent chapters will also consider this distinction in both typical and autistic children (Chapters Three to Six).

Chapter Three

The development of reputation management in typical children

Note. Chapters Three to Six were conducted concurrently but are reported separately here for ease of interpretation.

3.1. Introduction

As shown in Chapter Two, and many other previous studies, there is abundant evidence that typical adults manage their reputation (e.g., Izuma et al., 2011; Haley & Fessler, 2005; Ariely et al., 2009; Lamba & Mace, 2010). Yet, there is comparatively little research on the nature and extent of reputation management in typically developing children. Further, enhancing our knowledge of the typical development of reputation management will also serve to inform our understanding of how autistic children manage their reputation (Chapters Five and Six).

Recent evidence suggests that typical children as young as 5 years may be capable of managing their reputation. Leimgruber et al. (2012) found that 5-year-old children shared more stickers with another child only when it was clear that the other child would see them sharing. Engelmann et al. (2012) also noted that when observed by a peer, children from the age of 5 would steal less and share more stickers. Finally, Shaw et al. (2014) noted that 6-year-old children could act with a "veil of fairness". They found that children would *appear* generous by selecting a coin toss to delineate prizes, however, after completing the coin toss in private, they lied about the results to gain the best prize for themselves. Thus, it appears that some skill in reputation management may be present from at least 6 years.

The above studies all noted a subtle and possibly automatic change in behaviour – for example sharing more or cheating less when observed – that may be conceptualised as *implicit* reputation management. Leimgruber et al. (2012) suggested that these subtle behaviour changes are implicit since the sensitivity to being observed occurs *before* children report an explicit understanding of reputation. Implicit reputation management and the automatic modulation of behaviour from a

young age could be beneficial for cooperation (Tomasello et al., 2012; Tomasello & Vaish, 2013) and ultimately for young children's friendships. Children who share more and steal less when observed may be more likely to be chosen as partners for play.

There are times, though, when an individual expends more effort to actively manage reputation, for example, by deliberately altering behaviour to achieve a certain reputation that could ensure future benefits. Evidence for explicit reputation management in childhood has previously been derived from the self-presentation literature. Self-presentation can be thought of as a more deliberate and strategic means to obtain a desired image (Banaji & Prentice, 1994; DePaulo, 1992). Previous research suggests that it is not until around 8 years that children attempt to deliberately self-promote (Aloise-Young, 1993; Banerjee, 2002a, 2002b). Also, it is not until 8 years of age that children explicitly report an understanding of the concepts surrounding reputation, such as how gossip can contribute to one's reputation (Hill & Pillow, 2006).

Shaw et al. (2013) propose that these implicit and explicit distinctions are an important facet of reputation management, and claim that implicit reputation management appears prior to explicit reputation management. However, there is a paucity of research in support of this explicit-implicit distinction in childhood, that is, whether during typical development there is evidence for such a distinction, and whether the two aspects show different developmental trajectories. To the best of my knowledge, no other study has attempted to test both implicit and explicit forms of reputation management within the same group of children.

3.1.1. The current study

This study investigated the development of reputation management by using novel tasks to measure both implicit and explicit reputation management in children aged 6 to 14 years. This age range was selected as, given the research discussed above, one may expect to find reputation management from 6 years of age. This study is thus interested in how this ability develops across time and into adolescence. Using a large age range enabled me to determine whether explicit and implicit manifestations of reputation management follow different developmental trajectories.

Novel tasks were designed to examine both implicit and explicit reputation management. To test for implicit reputation management, children completed several one-shot dictator games (Camerer & Fehr, 2002), where they were asked to decide how many points they wanted to share with others. Crucially, children completed this task once alone and once when observed by another child. If children implicitly manage reputation, they should be sensitive to observation and share more points when observed (Frith & Frith, 2008b). To test for explicit reputation management, children were presented with a situation in which they believed they had performed poorly on a task. They then had the opportunity to protect their reputation by deciding whether they wanted other people to know how they had performed on the task. If children have an explicit awareness of their reputation being at stake, then they should decide to prevent other people becoming aware of their poor performance.

I predicted that there would be a distinction between explicit and implicit reputation management, as suggested by Shaw et al. (2013). In line with previous research (Engelmann et al., 2012; Leimgruber et al., 2012; Shaw et al., 2014), it is predicted

that implicit reputation management – as manifested by a subtle change in behaviour when observed – should appear from 6 years. A more deliberate and explicit form of reputation management, as shown by a desire to protect one's reputation when it is clearly at stake, should be present later on in development, by approximately 8 years, as suggested by self-presentation research (Aloise-Young, 1993; Banerjee, 2002a, 2002b; Banerjee & Yuill, 1999).

3.2. Method

3.2.1. Participants

Ninety-four typically developing children took part in the current study, aged from 6 to 14 years. These children were categorised into four age groups, 6-7 year-olds, 8-9 year-olds, 10-11 year-olds and 12-14 year-olds, as shown in Table 8. Children were recruited through primary schools and Scout groups in the London area, and through a science club run at the Institute of Education during the school holidays.

Table 8.

Descriptive statistics, including mean, standard deviation and range, for age, gender and intelligence quotient (IQ) measures for each age group.

		6-7 year-olds	**8-9 year-olds**	**10-11 year-olds**	**12-14 year-olds**
n		26	26	19	23
Gender ratio (M:F)		17 : 9	12 : 14	9 : 10	7 : 16
Chronological age (years)	*M* (*SD*)	6.82 (.65)	8.94 (.52)	10.75 (.62)	13.17 (.86)
	Range	5.46 – 7.88	8.08 – 9.87	10.00 – 11.80	12.15 – 15.21
Verbal mental age*	*M* (*SD*)	7.11 (1.01)	9.66 (1.27)	12.11 (1.17)	13.91 (1.57)
	Range	5.46 – 9.10	6.69 – 11.43	10.30 – 14.63	10.66 – 17.51
Full-scale IQ	*M* (*SD*)	105.38 (12.37)	107.04 (11.77)	111.42 (8.51)	105.04 (10.81)
	Range	85 – 129	80 – 128	93 – 125	87 – 129
Verbal IQ	*M* (*SD*)	104.27 (10.78)	107.81 (11.08)	113.63 (9.51)	105.61 (9.48)
	Range	80 – 120	80 – 123	102 – 134	86 – 131
Performance IQ	*M* (*SD*)	105.08 (14.95)	104.69 (18.23)	106.79 (11.44)	102.78 (12.26)
	Range	74 – 132	67 – 150	83 – 131	79 – 119

Notes. *Verbal mental age was calculated by dividing verbal IQ by chronological age, and then multiplying by 100. IQ was measured using the WASI-II (see section 3.2.4).

Although the gender distribution within each age group differed, a chi-square test showed that there was no significant association between age group and gender, $\chi^2(3) = 6.03$, $p=.11$, $\varphi = .25$. MANOVA was used to test for differences in the IQ measures (see section 3.2.4) between age groups, and revealed only a significant main effect of age for verbal IQ, $F(3, 90) = 3.35$, $p=.022$, $\eta_p^2=.10$. Post-hoc corrections revealed that this was driven by a significant difference between 6 to 7-year-olds and 10 to 11-year-olds, $p=.021$. Controlling for verbal IQ, however, did not change any of the

results reported in this chapter or Chapter Four. The contribution of verbal ability to reputation management and its potential mechanisms in typical development is further considered in section 4.3.2.

Ethical approval for this study was obtained from the Faculty of Policy and Society's Research Ethics Committee at the Institute of Education, London. Children over the age of 11 years gave their written consent to take part in the research and children under the age of 11 gave verbal assent. Immediately prior to the research, children confirmed that they understood that their parents had agreed to allow their participation, were briefed on the nature of the research and were told that they could stop the research at any time. Children were debriefed verbally following the conclusion of the research and parents' received a debrief letter outlining the aims of the research.

3.2.2. Design

The current study had a mixed design. The independent variable for both the explicit and implicit reputation management tasks was age group (6 – 7 years, 8 – 9 years, 10 – 11 years and 12 – 14 years). The dependent variables for each task are outlined below.

3.2.3. Materials & procedure

Two novel tasks were designed to measure whether children manage their reputation, both implicitly and explicitly. The order of conditions within both these tasks was counterbalanced (see below). All tasks were presented on 13" Windows 7 Toshiba Portege laptops using MATLAB (The Mathworks, Massachusetts, USA) and Cogent toolbox (LON, FIL, & ICN, London, UK).

Introduction to Verden. All tasks (including those described in Chapters Four to Six) took place in the context of a pretend online gaming world named 'Verden', which served to engage children with the experimental tasks and to create an overarching theme to the study. Children were led to believe that they were logging in to Verden, where there were many different games for them to explore and other players online with whom they could interact. Each player was represented by a simple avatar and the child was able to choose his/her own avatar (Figure 9). Furthermore, children could accumulate points throughout the session, which they could also spend. The amount of points was fixed across participants, to help keep the external motivation for points similar. Subsequently, all children were rewarded 200 'bonus points' for joining Verden. Following this introduction, children completed the implicit reputation management task and the explicit reputation management task was completed later on in the session (see section 4.2.2 for full details of task orders).

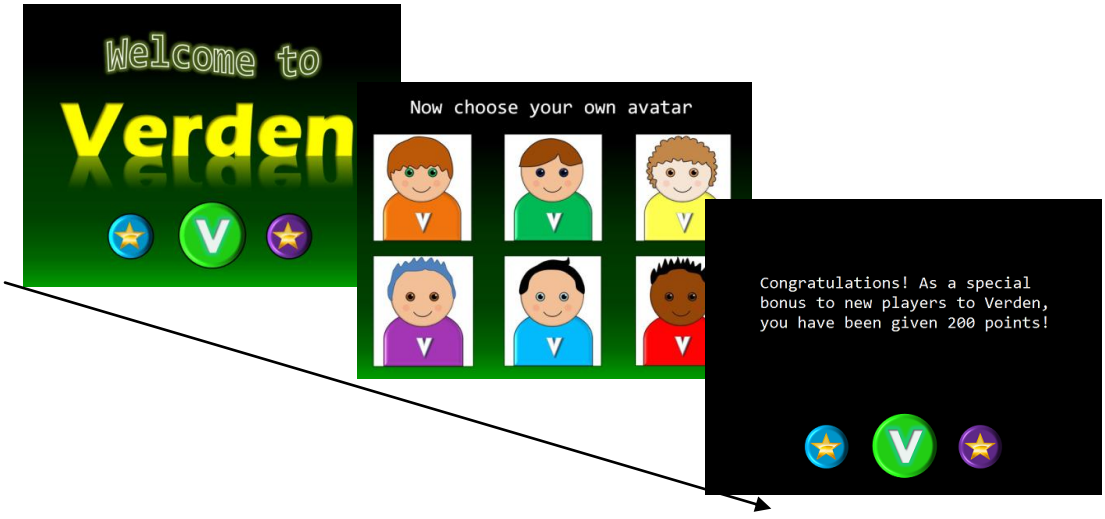


Figure 9. Excerpts of children's introduction to Verden (manually controlled by experimenter).

Implicit reputation management task. This task was designed to test whether children would change their behaviour when observed by sharing more points with another player, which would indicate implicit reputation management. Children played 10 one-shot dictator games once unobserved and once when observed, resulting in 20 trials in total. These dictator games were played with other players in the online world. Children were instructed that they were going to play a decision making game: *"You are going to meet some of the other players in Verden. Each time you meet a new player, you will get 10 points. You can give him or her some or all of these points and you keep the rest".* Children were then asked, *"How much do you want to give [name of other player]?"* Children input the number of points they wished to give to the other player (between 0 and 10 points) using the keyboard. S/he then viewed the number of points the other person would receive and how many points they themselves would keep (Figure 10).

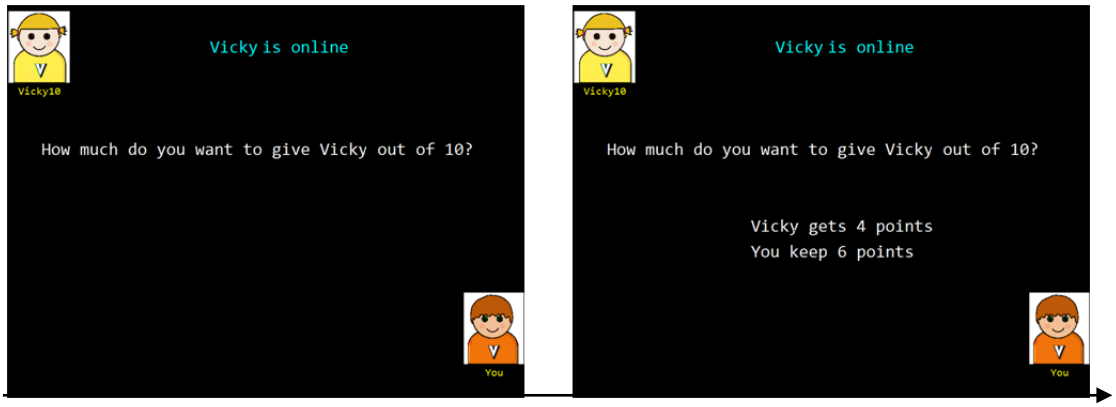


Figure 10. Example of a single trial from the implicit reputation task, in which children are first asked how many points they would like to share with the other player. After making their choice, the allocation points to the other and to the self were shown on-screen.

To familiarise children with the trial procedure, they all completed one practice trial before the experimental trials. The experimenter read the on-screen layout (as shown

in Figure 10) and showed children the keys they would be using to make their choices. Children were briefed on how points could be divided, by showing them the various combinations they could use on a sheet of paper. For example, if they gave the other person 0 points, they would keep 10 points, and if they gave 1 point, they would keep 9 points, and so on. This sheet was left out for all children to consult, if needed. Children were also reminded that they were free to make any decision they desired.

All children completed the implicit reputation task under two conditions: once unobserved and once whilst observed by another child. The other child was being tested separately on the same tasks with another experimenter. Therefore, two children were tested at the same time, with two experimenters, Experimenter 1 and Experimenter 2. The two children observed one another completing the task during the observer condition.

To justify why the two children needed to observe one another completing the task, an error occurred on *one* of the children's laptops. The order of observed and unobserved conditions was counterbalanced across children. If the children completed the unobserved condition first, the error occurred after the first 10 trials of the task. If the children completed the observed condition first, the error occurred immediately after they had been introduced to Verden. The word 'error' appeared several times in red on screen followed by 'terminate program'.

Following the error, Experimenter 1 (E1) exclaimed that something had gone wrong and suggested they could ask Experimenter 2 (E2) for help. E1 subsequently took the child to where E2 was completing the tasks with the other child. E1 described the problem to E2, who then went to "fix" the broken laptop. In the meantime, E1

suggested the two children should play the decision making game together while E2 attempted to fix the laptop. To ensure that the child observing was paying attention, and that it was clear to the child being observed that s/he *was* being observed, the child who was observing was asked to write down all of the other child's answers. This was justified on the premise that E1 was particularly worried that something was wrong with Verden and the laptops, thus it would help if the other child assisted by writing down the other child's decisions, lest the laptop broke again.

Once one child had completed the task whilst observed, the children exchanged places so that the other child could complete 10 trials observed. Once both children had observed each other completing the task, E2 returned and claimed the broken laptop had been fixed. If the unobserved condition had been first, children moved on to the next task. If the observed condition was first, they completed the task again unobserved, under the premise that they had to *"do it again just to double check all the laptops were working".* The mean number of points (from 0 to 10) given in the observed and unobserved conditions were calculated followed by the observer effect (the difference score between observed and unobserved conditions). This novel measure taps implicit reputation management by testing whether children are affected by the presence of an observer, by increasing the number of points given in the observed condition in order to appear generous.

Explicit reputation management task. This task was designed to test whether children would attempt to manage their reputation when it was explicitly at risk, by giving them the opportunity to prevent others knowing about poor performance on a game, and thus protect their reputation. Children were asked to test games in Verden. These games were simple computer games run through MATLAB, suitable for a wide age range, namely 'Snake' (Ekstrom, 2007) and 'Connect Four' (Stahl, 2001).

Children also played a third game which was a measure of inhibitory control under the pretext of a game (as described in Chapter Four). Children first played Snake, followed by Connect Four, and finally the inhibitory control task. After playing 'Snake' and 'Connect Four' for approximately 2 minutes each, children were informed that all other players in Verden had been playing the game, and a leader board was available. Children were subsequently asked if they would like to view their position on the leader board, a binary choice of 'yes' or 'no'. Unbeknownst to them, their position on the leader board was manipulated, such that children either came in first place or in eighth place (out of 10 players) on the leader board. Leader board position was counterbalanced, such that children either came first or eighth place following the first game, with the converse displayed following the second game. If children decided to view the leader board, they were further asked whether they would like to save their position by making a simple yes/no judgement. It was emphasised that saving would mean that others would be able to view their position on the leader board. Children were then asked how many points (out of 10) they would like to spend in order to save or not save their score (Figure 11).

Figure 11. Example trial structure during the explicit reputation task. Children were first given the option to see the leader board, and if they decided to do so, they saw their position on the leader board (either first or eighth). They were then asked if they

would like to save their score, followed by how many points they would like to spend to save or not save their score.

The dependent variables of interest in this task were children's binary choices of whether or not they wanted to (1) see the leader board, (2) save or not save their position, and (3) the number of points spent either to save or not save. Children who said "no" to saving their position on the leader board when they appeared near the bottom were considered to have explicitly managed their reputation, since they protected their reputation by preventing others knowing that they had performed poorly on one of the games. All children played a third and final game (the inhibitory control task, described in section 4.2.3) in which they came top of the leader board, which ensured that the session ended on a positive note.

3.2.4. Intellectual functioning

Intellectual ability, shown in Table 8 above, was measured using the Wechsler Abbreviated Scale of Intelligence (WASI-II; Wechsler, 2011). The WASI-II has been validated for use with children from 6 years of age and gauges an individual's verbal, perceptual and full-scale intelligence quotients. This information was used to profile the ability level of the children in this study.

3.3. Results

Implicit reputation management. The mean number of points given to the other when observed and unobserved was calculated, followed by the 'observer effect' – the difference score between observed and unobserved conditions. There was an outlier in the 12 – 14 age group with an observer effect z-score of -6.22, exceeding the recommended cut off for outliers (Field, 2009). This outlier was therefore removed from subsequent analyses.

The mean number of points shared when unobserved and observed according to age group is shown in Figure 12 below. Initial inspection of this figure shows a general increase in the number of points shared over time, and possible differences between observed and unobserved conditions for children in the 12 – 14 year-old group.

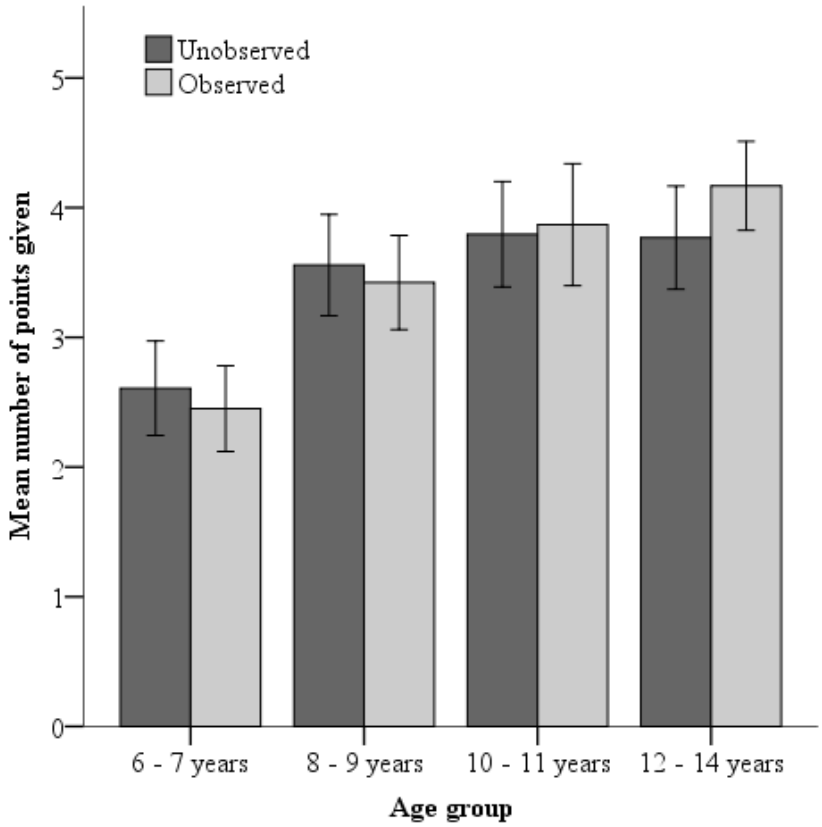


Figure 12. Mean number of points given to other players when unobserved and observed for each age group. Error bars indicate +/- one standard error.

The observer effect was calculated by subtracting the number of points shared when unobserved from the number of points shared when observed. Figure 13 below shows box plots, including individual data, of this observer effect. The data appears to show that there may be a reduction in the variation of the observer effect with age. A one-way between-participants ANOVA was conducted on the observer effect to test for differences between the age groups, and found no significant main effect of age group, $F(89) = .75$, $p=.52$, $\eta_p^2 = .025$. Further analyses using one-sample t-tests were used to test whether this observer effect significantly differed from zero, to

establish whether observation caused a significant change in behaviour. Only 12- to 14-year-olds showed an observer effect that was approaching significance, $t(21) = 1.50$, $p=.074$, $r=.31$, one-tailed.

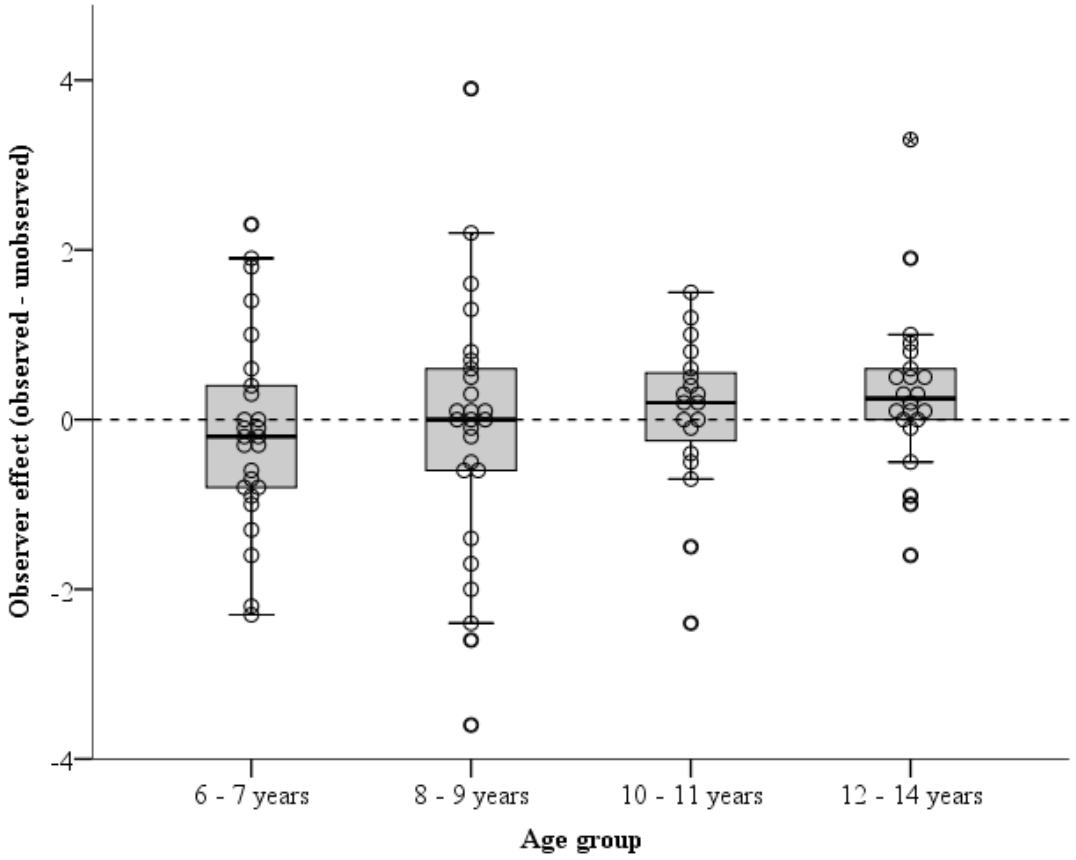


Figure 13. Box plots of the observer effect across each age group, including individual data (circles, outlier removed). The dotted line represents no observer effect (i.e. the child gave the same number of points when observed and unobserved).

Explicit reputation management. In this task, children had the opportunity to see their position on a leader board after playing a game. There were a number of children within each group who did not want to see the leader board at all: when they would have been top of the leader board, four 6-7 year-olds, two 8-9 year-olds, and one 10-11 year-old elected not to view the leader board. All 12-14 year-olds indicated that they wanted to see the leader board. When they would have appeared bottom of the leader board, four 6-7 year-olds, two 8-9 year-olds, and two 12-14

year-olds indicated that they did not want to see the leader board. All 10-11 year-olds wanted to see the leader board in this condition. Those who elected not to see the leader board moved on to the next task. Table 9 shows only children who *did* want to see the leader board, and the number of children who decided to save or not save their position when they were in top or bottom position.

Table 9.

Number of children in each group who chose to save or not save their position on the leader board (top or bottom).

	Position			
	Top of the leader board		Bottom of the leader board	
Save?	Yes	No	Yes	No
6 – 7 years	20	2	10	12
8 – 9 years	23	1	6	18
10 – 11 years	17	1	8	11
12 – 14 years	23	0	11	10

Considering children's decisions when they came top of the leader board, the majority of children in each age group decided to save their position. Chi-square confirmed that there was no association between age group and decision to save when top, $\chi^2(3) = 2.17$, p=.53, φ =.16. Furthermore, binomial tests confirmed that all groups were significantly above chance for selecting to save their position (all ps<.001).

When bottom of the leader board, several children within each age group indicated that they did *not* want to save their position. Chi-square showed that there was no significant association between age group and decision to save when bottom of the leader board, $\chi^2(3) = 3.86$, p=.28, φ =.21. Binomial tests were used to test whether

any group differed from chance in their decision to save when bottom. Only 8-9 year-old children differed significantly from chance (p=.023), with children of this age tending to decide *not* to save their position when bottom of the leader board, whilst the other age groups showed no distinct preference for saving.

Following their decision, children were asked to indicate how many points (between 0 and 10) they wanted to spend to save (or not to save) their score (Table 10). This measure was designed to indicate children's motivation to save (or not to save) their position on the leader board.

Table 10.

Mean number of points (and standard deviation) spent following decision to save (or not to save) position on the leader board, according to each age group.

	Position			
	Top of the leader board		Bottom of the leader board	
	Yes	No	Yes	No
6 – 7 years	3.30 (3.94)	5.00 (7.07)	2.20 (3.16)	1.58 (1.73)
8 – 9 years	4.65 (3.58)	0.00 (.00)	4.17 (4.12)	1.83 (2.23)
10 – 11 years	5.13 (2.36)	5.00 (.00)	1.63 (1.69)	4.00 (3.62)
12 – 14 years	4.61 (3.13)	-	3.00 (3.03)	5.20 (3.05)

A 2 (decision to save: yes or no) x 4 (age group) between-participants ANOVA was conducted on the number of points spent when children had come bottom of the leader board. There was no significant main effects of age group, $F(1, 77) = 2.20$, p=.093, η_p^2 =.08 or decision to save, $F(1, 77) = .41$, p=.53, η_p^2 =.005. There was, however, a significant interaction between age group and decision to save, $F(1, 77) = 3.11$, p=.031, η_p^2 =.11. To examine this interaction, planned comparisons using one-way ANOVA on the number of points spent revealed only a significant main effect

of age, $F(3, 49) = 5.08$, $p=.004$, $\eta_p^2 = .25$. Specifically, post-hoc corrections showed that 12-14 year-olds differed from 6-7 year-olds ($p=.015$) and 8-9 year-olds ($p=.014$) by spending more points *not* to save their leader board position.

3.4. Discussion

Given the paucity of research and available tasks for examining reputation management during typical development, the current study used novel tasks to determine when explicit and implicit reputation management emerge during development, and whether these two aspects of reputation management have different developmental trajectories. The results suggest that implicit reputation management may not emerge until much later on in development than anticipated, possibly not until adolescence. Explicit reputation management, however, appeared earlier in development at approximately 8 years.

Little evidence of implicit reputation management was found across all age groups, although there was a trend towards an effect for children aged 12 to 14 years. There are two alternative explanations for this result: either the task was not sufficiently sensitive to detect implicit reputation management, or implicit reputation management does not emerge until later adolescence.

Considering the suggestion that the task was not sensitive enough, studies with adults frequently use subtle measures to measure implicit reputation management: for example, adults will donate more to charity when observed by another person (Izuma et al., 2011, Chapter Two) and even alter their behaviour when only a pair of eyes are present (Bateson et al., 2006; Nettle et al., 2012a). Interestingly, in my study with adults (Chapter Two), a significant observer effect was found when typical adults donated to charity, but not when they donated money to other people. This finding

may suggest that this context was also not sufficiently sensitive to produce reputation effects, and that typical individuals may select to change their behaviour more in situations when it is clear that they *could* gain reputational benefits, for example, by looking like a generous person by donating more money specifically to charity when observed (Eckel & Grossman, 1996; Izuma et al., 2011). Implicit reputation management, in this sense, may not be truly implicit, if observation only triggers reputation management in situations where there is a clear benefit to the self. Indeed, Nettle et al. (2012a) suggest that people change their behaviour in response to subtle cues precisely to *appear* generous. Young children also have been noted to attempt to operate a "veil of fairness" in order to appear generous (Shaw et al., 2014) suggesting that the so-called subtleties of implicit reputation management may have a degree of deliberate intent to appear as a "good" person only in specific conditions which are more likely to lend to this type of reputation (e.g. donating to charity rather than a person). In this way, I suggest that implicit reputation management may in fact be a honed skill that develops into adulthood, whereby it becomes more automatic in nature, resulting in more consistent effects of observation (Bateson et al., 2006; Nettle et al., 2012a; Oda et al., 2011).

Adolescence is therefore proposed to be an important time in the development of implicit reputation management. During adolescence, young people become more sensitive to what others think of them (Blakemore & Mills, 2014; Sebastian, Burnett, & Blakemore, 2008), which may lend itself to a greater degree of implicit reputation management. This suggestion and the current findings conflict with previous research which found implicit reputation management in children as young as 5 years (Engelmann et al., 2012; Leimgruber et al., 2012). Arguably, these previous studies test reputation management in a context which is not entirely implicit. Rather, that

there is a risk of punishment in these studies: for example, a peer could tattle on the child for stealing stickers in Engelmann et al.'s (2012) study, and in Leimgruber et al.'s (2012) study children were sharing directly with the observer, a familiar child, who could potentially punish their actions in future interactions. In the current study, children were watched by an unfamiliar child while sharing points with a player in an online gaming world. An increase in the number of points shared when observed may suggest a true indication of implicit reputation management since other variables, such as risk of punishment, are reduced, and there is no obvious benefit to changing one's behaviour other than to boost one's reputation. Engelmann et al. (2012) acknowledge that concern for reputation likely peaks in adolescence alongside greater experiences with peers. Indeed, changing behaviour when observed due to a concern for punishment is likely a preceding step before a concern specifically for reputation motivates behaviour.

In the explicit reputation management task, where children had the opportunity to protect their reputation when it was clearly at stake, there was a peak at 8 to 9 years of age, where children of this age decided at above chance levels to protect their reputation by *not* saving their position on a leader board. All other age groups showed no distinct preference when bottom of the leader board. When top of the leader board, all age groups tended to choose to save their position, suggesting that this task was valid in measuring explicit reputation management. At 8 to 9 years, there may have been a greater desire to protect reputation for several reasons. Previous research has suggested that 8-year-old children begin to use deliberate self-presentational strategies (Aloise-Young, 1993; Banerjee, 2002a, 2002b), implying that at this age children may have a new and heightened sensitivity to presenting the self in a positive light. Additionally, there may be a general shift towards less

egocentric thinking at 8 years (Fehr et al., 2008), and thus a greater awareness that one's behaviour could be judged by others. In the current task, children were being assessed on their competency in computer games. Children aged 8 to 9 may be particularly concerned about their comparative performance in these games, while older children may put greater emphasis on performance in other aspects of life, such as social competency (Sebastian et al., 2008). Interestingly, older children decided to spend more points specifically not to save their position on the leader board when they came near the bottom. This finding could reflect the fact that the older children who *did* decide to protect their reputation were more concerned (and therefore willing to pay more) about preventing others from knowing about their allegedly poor performance in the game. In turn, this finding could reflect older children's hypothesised increased concern for reputation (Sebastian et al., 2008). However, since the older children showed no distinct preference for whether or not they decided to protect their reputation in the first place, there could be great individual differences in this explicit concern for reputation, which may also be impacted upon by personality correlates such as extraversion. Karmiloff-Smith (1990) also notes that development can follow a U-shaped rather than linear trajectory, with different mechanisms influencing development at different stages – as Chapter Four sets out to examine. The current data (see Table 9) suggest that explicit reputation management may follow a U-shaped developmental trajectory.

3.4.1. Limitations and future directions

Given the small sample size of each age group, caution in interpreting the results, particularly those related to implicit reputation management, is warranted. The effect of observation was only showing a trend towards significance for 12-14 year-olds, although the effect size was moderate. Another means to examine the lack of implicit

reputation management is to test the possible mechanisms underpinning reputation management, as Chapter Four intends to examine in typical development. This approach could elucidate whether any specific mechanisms can explain exactly why implicit reputation management may not occur until adolescence. Further, extending the age range into later adolescence and using the same tasks as described here could confirm the hypothesis that implicit reputation management does not emerge until later in development. Given the suggested importance of peers (Blakemore & Mills, 2014), it would be interesting to manipulate the identity of the observer, with the assumption that friends would cause a greater degree of reputation management than unfamiliar peers.

Although there were interesting results regarding the number of points spent to save (or not to save) children's leader board position, there are some limitations to this measure. It could be the case that older children assign less reward value to the points, meaning that they are willing to spend more points. However, there was a specific effect for older children who said "no" to saving when bottom of the leader board, such that they spent *more* to ensure others did not know that they had come bottom of the leader board. This indicates that this is a valid measure for indicating motivation. This "point spending" measure is therefore currently a useful metric to attempt to gauge children's motivation behind their binary decision.

The current findings suggest that reputation management may have a relatively protracted development, both implicitly and explicitly. Implicit reputation management did not appear until early adolescence. Explicit reputation management appeared at around 8 years of age, but appeared to become more refined and selective during later childhood. Chapter Four will consider precisely which specific

cognitive mechanisms might underlie the ability to manage reputation during typical development, in an attempt to explain this variability in reputation management.

Chapter Four

The mechanisms underpinning reputation management in typical development

4.1. Introduction

The results of Chapter Three showed that there are two different types of reputation management – one that is implicit and one that is explicit in nature – and these appear to follow distinct developmental trajectories. The results indicated that implicit reputation management has a relatively protracted development, not present until adolescence. Explicit reputation management, however, appeared at approximately 8 years. Further research is needed to enhance our understanding of the underlying psychological mechanisms that may explain these trajectories. As such, the current study considered four potential underlying mechanisms – theory of mind, social motivation, expectations of reciprocity, and inhibitory control – to strengthen and expand our knowledge of the development of both explicit and implicit reputation management in typical children. Furthermore, understanding these underlying mechanisms could help enhance understanding of individual differences within reputation management.

The ability to think about the thoughts, beliefs and desires of other people – theory of mind (ToM) – seems necessary for reputation management (Izuma, 2012), since one must be able to think about how they are seen in the eyes of others before they manage reputation. As such, those with better ToM skills may be better at managing their reputation. Only one study has directly tested the link between ToM and reputation management in children, however. Banerjee and Yuill (1999) found an association between understanding of self-presentational motives and second-order ToM in children aged 6 to 8 years, with those with better ToM skill having a better understanding of self-presentation. Self-presentation can be considered an aspect of explicit reputation management, with individuals consciously aware that they are presenting the self in a deliberate way. Hill and Pillow (2006) also speculate,

although do not measure, a relationship between ToM and a child's reported understanding of reputation.

Even if a child possesses a theory of others' minds they must be motivated to use this ability (Apperly, 2012). Some argue that such social motivation can be evidenced early on in development. For example, Chevallier et al. (2012a) claim that social orientation – as expressed by preference for faces – indicates an early preference for social stimuli that means these stimuli are rewarding from infancy. Chevallier et al. (2012a) also claim that social maintaining, the desire and effort made to sustain social relationships, is another manifestation of social motivation. The techniques children use to maintain social relationships may include self-presentational strategies and ingratiating behaviours. Fu and Lee (2007) investigated the development of flattery, an effective means of ingratiation. They found that 6-year-old children tended to flatter the artist of a drawing when its artist was observing them, suggesting that they were socially motivated to maintain a positive relationship with the artist and perhaps establish a good reputation.

Another potential mechanism underlying reputation management is reciprocity. Direct reciprocity is a contingent behavioural response to another's actions, often thought of as "tit for tat" (Falk & Fischbacher, 2006). For example, one could respond to another's behaviour either by rewarding, matching or punishing that behaviour. Reciprocity is thought to be one of the foundations of cooperation (West et al., 2011). Children from the age of around 5 begin to consistently match their partner's behaviour in terms of reciprocity in a cooperation game (House, Henrich, Sarnecka & Silk, 2013). Reciprocity can also be thought of as a norm that is learned and followed in social interactions (Gouldner, 1960). From around the age of five, children report an understanding of the norm of reciprocity (Berndt, 1977).

An expectation of reciprocity may be necessary for reputation management. Indirect reciprocity is a key method by which reputational information is transferred – if individual A is observed helping individual B by a third party (individual C), C may then help A on the basis of their previous helping behaviour. C may also pass on information about A's previous behaviour to others (Nowak & Sigmund, 2005). Olson and Spelke (2008) report evidence for indirect reciprocity in children as young as 3.5 years. Understanding how the principle of reciprocity links to one's reputation, and expecting that others *will* reciprocate, could contribute to the propensity of reputation management. Specifically, one must expect others to reciprocate – either directly or indirectly – in order to invest valuable time and resources into managing reputation.

Developmental changes in executive function could also affect the extent of reputation management in childhood. Executive functions incorporate a number of cognitive processes that underlie goal-directed behaviour (Best & Miller, 2010), which develop throughout childhood and adolescence (Blakemore & Mills, 2014). Executive functions include response inhibition, working memory, and shifting, components which may be separable and have different developmental trajectories (Huizinga et al., 2006). In this chapter I focus specifically on inhibitory control. Inhibitory control could play a particularly important role in reputation management given that in order to present oneself in a particular way, one may need to inhibit certain behaviours that may be detrimental to successful reputation management.

4.1.1. The current study

The current study examined for the first time the potential mechanisms underlying reputation management in typical development. Specifically, I investigated whether

individual differences in reputation management were associated with variation in children's theory of mind, social motivation, expectations of reciprocity and inhibitory control. The same children from Chapter Three participated in the current study, and all had completed the tasks measuring explicit and implicit reputation management. Specifically, in the explicit reputation management task children had the opportunity to protect their reputation when it was clearly at risk. In the implicit reputation management task, children were observed by a peer sharing points with another player – any differences in the amount of sharing compared to when they were unobserved was suggestive of implicit reputation management.

The four mechanisms were tested using a number of tasks designed to tap into these mechanisms. Second-order ToM was measured with the Strange Stories task (Happé, 1995; White et al., 2009a). Social motivation was measured by giving children the choice between playing on their own or with someone else, and children were also asked to complete the Friendship Motivation Questionnaire (Richard & Schneider, 2005). Previous research has examined attention to social stimuli such as static images of faces as an index of social motivation. However, Risko, Laidlaw, Freeth, Foulsham, and Kingstone (2012) note that these static stimuli are far from real social rewards, such as a real social interaction. Therefore, the possibility of receiving the reward of interacting with another person should provide a more direct test of a child's social motivation than previous methods. Third, children's expectations of reciprocity were measured by adapting the dictator game. Finally, the current study measured inhibition skills using a child-friendly go/no-go task (Cragg & Nation, 2008).

4.2. Method

4.2.1. Participants

The same participants from Chapter Three completed all of the below measures (n = 94, see section 3.2.1). The children were divided into the same age groups: 6-7 year-olds (n = 26), 8-9 year-olds (n = 26), 10-11 year-olds (n = 19) and 12-14 year-olds (n = 23).

4.2.2. Design

This study used an individual differences design. The outcome variables were two measures of reputation management ("explicit" and "implicit"), as detailed in Chapter Three (section 3.2.3). The predictor variables were the four possible mechanisms of reputation management - theory of mind, social motivation, expectations of reciprocity, and inhibitory control (Figure 14).

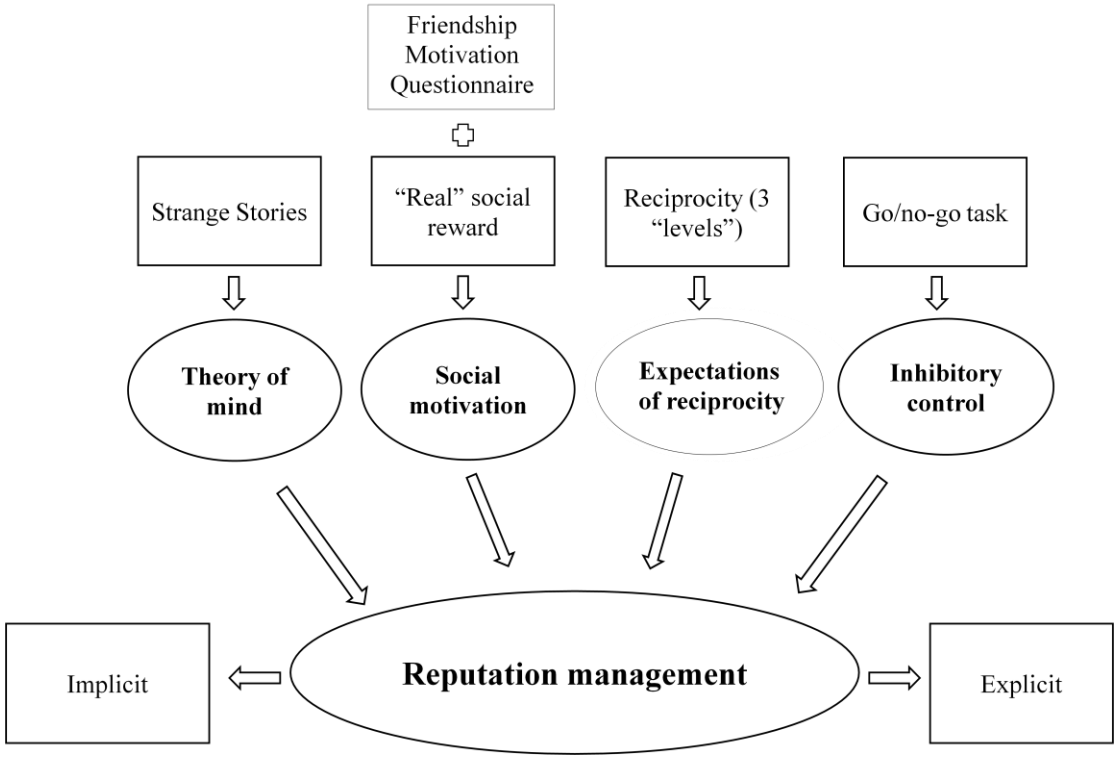


Figure 14. Illustration of study design. Tasks are presented in rectangular boxes while the constructs the tasks have been designed to measure are presented in ellipses.

Tasks were presented in two 20 to 30 minute sessions administered in a fixed order. Session one included the implicit reputation task, social motivation and the Strange Stories task (Happé, 1994; White et al., 2009a). Session two included tasks designed to measure reciprocity, the explicit reputation task, the inhibitory control task (the go/no-go task), and the Friendship Motivation Questionnaire (Richard & Schneider, 2005). A fixed order was used to ensure that all individuals were exposed to identical contexts, a method frequently used in individual differences research (Carlson & Moses, 2001). This study was primarily interested in individual differences rather than mean level performance on tasks. If there is a carryover effect across tasks, then this effect would be similar for all individuals (Bell, 2012).

4.2.3. Materials and procedure

As outlined in Chapter Three, all of the tasks were administered on 13" Toshiba laptops using MATLAB (The Mathworks, Massachusetts, USA) and Cogent toolbox (LON, FIL, & ICN, London, UK).

All children had previously completed the measures of explicit and implicit reputation management (section 3.2.3). In the explicit reputation management task, after playing a game children saw their position on a leader board, and had the opportunity to save this position. I manipulated whether they appeared first or eighth place on the leader board, under the premise that some children would be less likely to want others to know that they had come eighth rather than first place. Thus, children who said "no" to saving their position on the leader board when they appeared near the bottom were considered to have explicitly managed their reputation. In the implicit reputation management task, children completed 10 one-shot dictator games once when unobserved and once when observed. Any difference in the number of points shared between the observed and unobserved conditions was considered indicative of implicit reputation management.

Theory of mind. Reasoning about others' minds was tested using the Strange Stories task (Happé, 1994). This task involves a series of stories designed to tap second-order ToM, which includes more complicated understanding of others' minds. The original Strange Stories task (Happé, 1994) was designed to test autistic individuals' ToM abilities in a context beyond the false belief task (Baron-Cohen et al., 1985), including concepts such as deception, double bluff and persuasion. Fletcher et al. (1995) and subsequently White et al. (2009a) reduced these stories to a subset of eight mental state stories and eight physical stories, which were designed to assess

reasoning about the physical world, and to test general story comprehension. White et al. (2009a), however, noted that there might be confounding factors within the physical stories, namely that many involved a human agent. They therefore introduced an alternative set of "nature" stories, rather than physical stories. The nature stories are thought to enable a more reliable exploration of the differences between mental state reasoning and general reasoning ability. White et al. (2009a) found that performance on the nature stories tended to be better in children with autism than their performance on physical stories – confirming that the physical stories may be confounded by other variables.

Consequently, six mental state stories and six nature stories (to capitalise on time in the current study) were used from White et al.'s (2009a) battery. The text of each story was presented on the computer screen accompanied by an appropriate picture. The order of presentation of stories, either mental state or nature, were presented in a randomised order for each child. The experimenter read each story aloud and then asked the child one question. Answers were scored 0 for an incorrect answer, 1 for a partially correct answer and 2 for a fully correct answer (maximum total score 12 points); see Table 11 for examples.

Table 11.

Example of mental state and nature stories from White et al.'s (2009a) Strange Stories task.

Story type	**Mental State**	**Nature**
Story text	One day Aunt Jane came to visit Peter. Now Peter loves his aunt very much, but today she is wearing a new hat; a new hat which Peter thinks is very ugly indeed. Peter thinks his aunt looks silly in it and much nicer	In stormy weather, rocks often fall from the top of mountains. One day on a mountain in the Dolomites, a very large boulder becomes loose and starts rolling down the mountain. It rolls and rolls and rolls, gathering

	in her old hat. But when Aunt Jane asks Peter, "How do you like my new hat", Peter says, "Oh, it's very nice".	speed and spinning and bouncing off the mountain side. Suddenly, there is a very noisy splash.
Question	*Why does he say that?*	*Why is there a loud splash?*
Incorrect answer (0 points)	Reference to irrelevant or incorrect facts/feelings (he likes the hat, he wants to trick her).	Reference to irrelevant or incorrect factors (it's very big so it's very noisy).
Partially correct answer (1 point)	Reference to trait (he's a nice boy) or relationship (he likes his aunt); purely motivational (so she won't shout at him) with no reference to aunt's thoughts or feelings; incomplete explanation (he's lying, he's pretending).	Reference to water without reference to the boulder (there was a pool at the bottom of the mountain).
Fully correct answer (2 points)	Reference to white lie or wanting to spare her feelings; some implication that this is for aunt's benefit rather than his, desire to avoid rudeness or insult.	Reference to the boulder falling into water to make the splash (the boulder must have fallen into a lake).

Social motivation. Social motivation was measured with two tasks which intended to gauge children's desire to be social. The first measure of social motivation was designed as an ecologically valid task. To begin, children were told that their assistance was required to test some of the new games in Verden, the online gaming world. Critically, they had the choice of playing either a two-player game with someone else or a one-player game on their own. Once they had made their choice, they were asked how many points (ranging from 0 to 10) they were prepared to "pay" to play either with someone or on their own, as a measure of motivation for their decision (Figure 15).

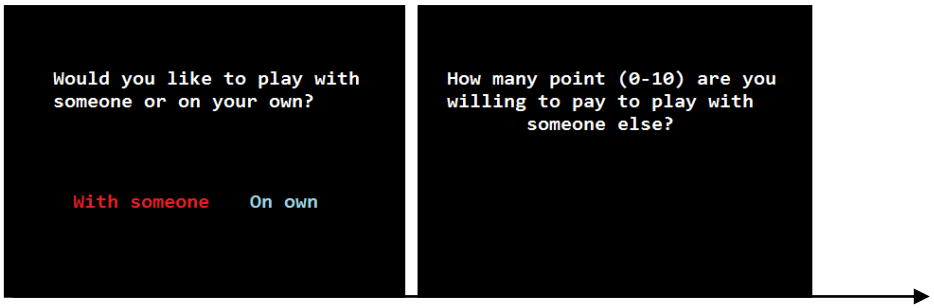


Figure 15. Task presentation in the social motivation task. Children were asked whether they wanted to play a game with someone or on their own, followed by how many points they would like to spend to play with someone or on their own.

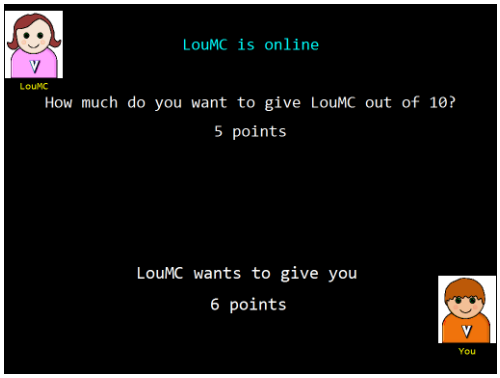
If the child decided to play a game with someone else, they played the two-player game "pong" (Buckingham, 2011). If the child wanted to play alone, s/he played the one-player game "Stellaria" (Zhang, 2011). Each game lasted approximately 3 minutes and was selected due to their suitability for a wide age range of children. The identity of the games was not revealed until the children had made their choice and performance was not recorded on these games. The two dependent variables indexing the degree of children's social motivation in this task included (1) their decision, scored in terms of a binary response (i.e., to play with someone or play alone) and (2) the number of points the participant decided to spend in order to play with someone or alone (from 0 to 10 points).

Second, social motivation was also measured using Richard and Schneider's (2005) Friendship Motivation Questionnaire for children, to further quantify children's desire to be social through their motivation to have friends. This measure was presented at the end of session two. Children were asked to think about why they wanted to have friends. They viewed 12 statements on-screen pertaining to the motivations for having friends; examples of these statements include "*to be invited to parties", "for the fun moments I have with friends"* and "*because it makes me feel*

better when I'm sad". Children rated each statement on a 4-point scale by deciding how much the statement sounded like them from *not at all like me* (score of '1') to *exactly like me* (score of '4') by making a corresponding key-press. A friendship motivation score was calculated by totalling the responses on the scale. A higher score indicates higher motivation for friendships (maximum score = 48).

Reciprocity. Economic games were used to test reciprocity in terms of whether or not children act reciprocally toward others and whether or not they expect others to act reciprocally toward them. Children played dictator games with other players in the online world, under the context of decision-making games.

Direct reciprocity. This task was designed to test for direct reciprocation – that is, to determine how children responded to an offer from another individual. At the beginning of the task, children were informed that, as before (in the implicit reputation management task), they were going to meet some of the other players in Verden and that each time they met someone, they would receive 10 points. Children used the keyboard to input how many points they would like to give to the other player (between 0 and 10 points) and the number of points they had decided to give appeared onscreen (Figure 16). Crucially, the child also saw how many points the other player wanted to give to them. Children either saw the other player's offer before or after s/he had made their offer. The number of points that the other had given was fixed such that the average number of points the other player shared was 5 points, which would be considered a fair offer. Children could make the first move (giving points to the other first, and then discovering the number of points they received in return) or the second move (receiving points from the other first, and then giving in return).

A. 

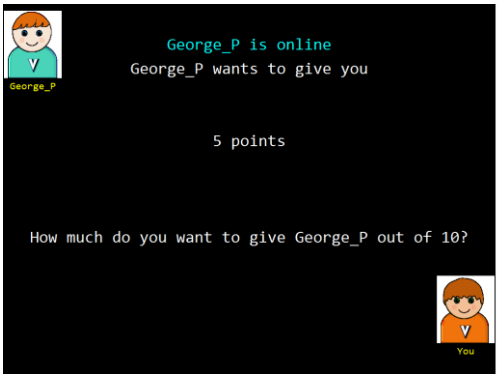
B. 

Figure 16. Example trial testing direct reciprocity: first move trials (A), where children give points to the other first and then see how many points the other gives them, and second move trials (B), where children see the number of points the other wants to give them and then they decide how many points to give in return.

After completing one practice trial, all children completed five first move and five second move trials. The order of presentation (first move or second move first) was counterbalanced across children. Each trial was "one-shot", played with a different player each time with a new set of points. In this task, the dependent variables of interest were (1) the mean number of points given under each condition (0 – 10 points), and (2) whether, in the second move condition, the child matched the offer they had been given (reciprocated), gave more (rewarding the other) or less (punishing the other) in return. Higher points would indicate a generous offer to the other player, and a mean offer of 5 points would be considered a fair offer.

Baseline: predictions of generosity. This task was designed to provide a baseline measure of children's predictions of generosity from others. This task followed a similar format to that of previous reciprocity tasks, except instead of being informed of how many points the other gave them, children were instructed to *guess* how many points they had been given (Figure 17). Children again had to decide how many points to give to another player (10 trials), with one practice trial at the start.

Children were informed that they were deciding how many points to give the other player *at the exact same time* as the other player decided how many points to give to them. Thus, neither player knew what the other was offering them. After deciding how many points to give to the other player, children could obtain 'bonus points' for correctly guessing how many points the other would give them. No feedback was given regarding whether or not they had correctly guessed, but all children did receive a fixed amount of 'bonus points' at the end of the task. The dependent variables of interest were the mean number of points offered and the mean number of points children guessed the other would give them (maximum 10 points), and the number of trials (out of 10) in which the children predicted they would receive more (reward), less (punishment) or the same number of points (reciprocal offer) from the other player. This task measures children's predictions of generosity from others with no reciprocal intent, providing a baseline for subsequent tasks.

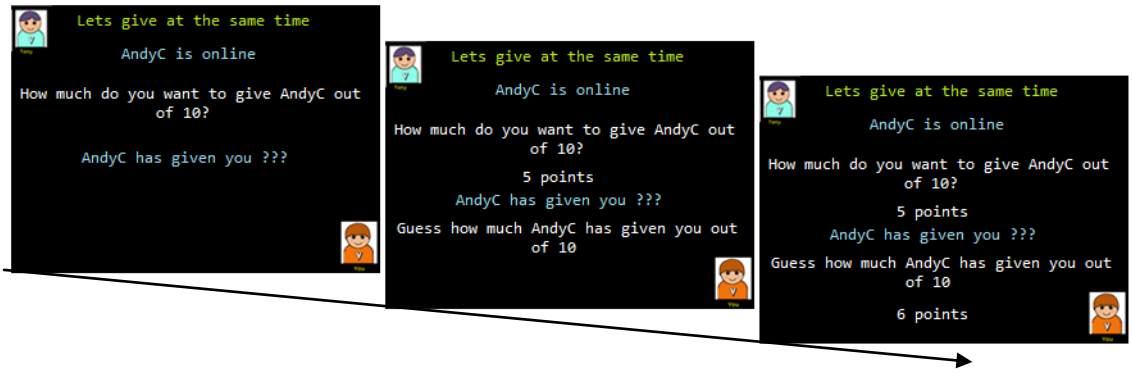


Figure 17. Example trial of predictions of generosity. Children first give points to the other player, and then have to guess how many points the other has given to them.

Expectations of reciprocity. The task designed to tap expectations of reciprocity followed a similar structure to the predictions of generosity task above, but this time children were informed that they would *give first* to the other player, and then they had to guess how much the other player would give them (Figure 18). The

experimenter informed the child that the other player would find out how many points they had been given prior to making their decision. This task consisted of one practice trial and 10 experimental trials, and the mean number of points offered and guessed were calculated, as well as the number of trials in which children expected the other to reward, punish or reciprocate their offer. This task therefore examines whether children were aware that the other's response would be contingent upon their own offer, in particular whether they would expect reciprocity as a response to their actions.

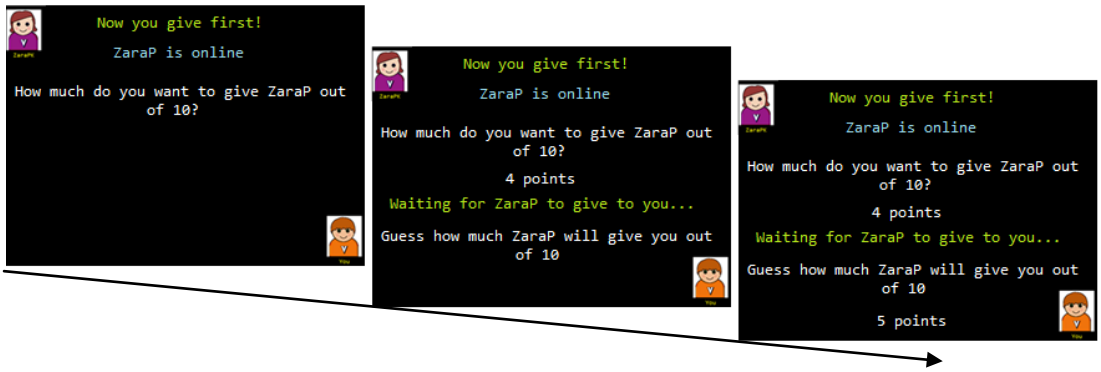


Figure 18. Example trial structure of expectations of reciprocity. Children first decided how many points to give the other player, and then had to guess how many points the other would give to them.

Inhibitory control. Inhibitory control was tested with a go/no-go task, where children have to inhibit a prepotent response. Following Cragg and Nation's (2008) task design, the go/no-go task was presented in the context of a football game (Figure 19). Children simply had to press the spacebar to "kick" a football every time it appeared on-screen. They were instructed to press the spacebar as fast as they could. Ten practice trials served to build a prepotent response to the football. Next, children were informed that they should continue to kick the footballs but *not* kick any rugby balls that appeared.

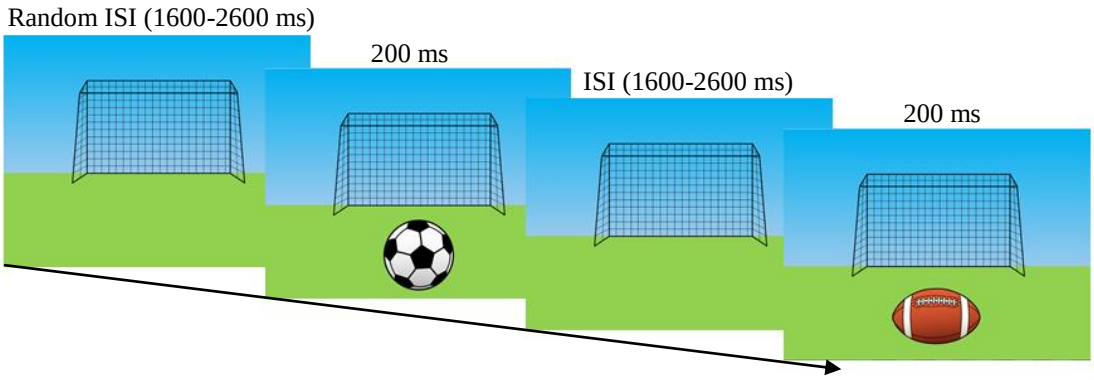


Figure 19. Trial procedure in the go no-go task. Children had to 'kick' any footballs that appeared on-screen, and refrain from kicking any rugby balls that appeared.

Children completed two blocks of 50 trials each (100 trials in total), including 13 rugby balls within each block (26%). In between the two blocks, children received genuine feedback regarding how many football and rugby balls they had kicked. The football or rugby ball appeared for 200 ms, with a random ISI between 1600 and 2600 ms between stimuli to ensure that the children could not predict when the stimulus would appear. The dependent variable was the child's mean d' score calculated across the two blocks. d' was calculated by taking into account the number of trials in which children had correctly kicked the football (hit rate) and incorrectly kicked the rugby ball (false alarm rate; see section 2.2.4 for full calculation).

4.3. Results

Children's performance on the explicit and implicit reputation management tasks are described in Chapter Three (section 3.2.3). Here, I first considered age-related changes for each task tapping the proposed mechanisms separately. Second, I examined whether individual differences on these tasks are related to variation in

children's performance on implicit and explicit reputation management tasks by using correlation and regression analyses.

4.3.1. Age-related changes within putative mechanisms

Theory of mind. Figure 20 below shows the mean scores for each age group on the Strange Stories task, for mental state and nature stories.

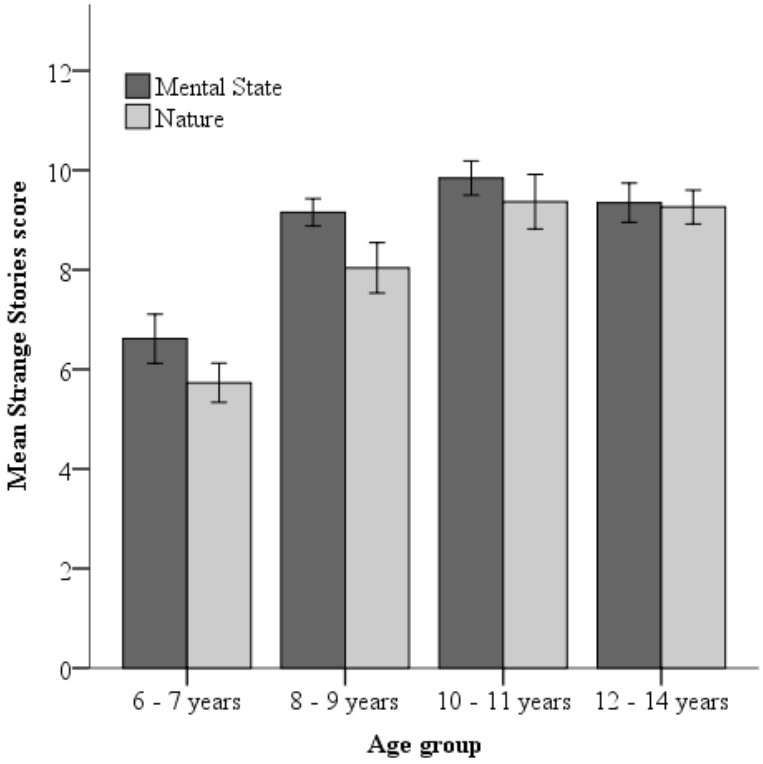


Figure 20. Mean scores on the Strange Stories task according to story type (nature or mental state) and age group. Error bars indicate +/- one standard error.

A 2 (story type: mental state or nature) x 4 (age group) mixed ANOVA was conducted on scores on the Strange Stories task. There was a significant main effect of story type, $F(1, 90) = 6.03$, $p=.016$, $\eta_p^2 = .06$, such that scores were higher on the mental state stories. There was also a significant main effect of age group, $F(1, 90) = 22.25$, $p<.001$, $\eta_p^2 = .43$, with performance improving with age. There was no

significant interaction between story type and age group, $F(3, 90) = .79$, $p=.50$, $\eta_p^2 = .026$.

Social motivation. The first measure of social motivation gave children the choice to play with someone or to play alone. The number of children who decided to play with someone or alone is shown below in Table 12.

Table 12.

Number of children who decided to play with someone or on their own, according to age group.

	Decision to play	
	With someone	On own
6 – 7 years	7	19
8 – 9 years	19	7
10 – 11 years	12	7
12 – 14 years	14	9

Chi-square was used to test for an association between age group and decision to play, and indicated that there was a significant association between these variables, $\chi^2(3) = 12.56$, $p=.006$, $\varphi = .37$. It appears that 6-7 year-olds preferred to play on their own, while all other age groups preferred to play with someone. Binomial tests further revealed that decisions to play were significantly above chance only for 6-7 year-olds and 8-9 year-olds ($p=.029$), with 6-7 year-olds preferring to play on their own, and 8-9 year-olds preferring to play with someone.

Following their decision to play with someone or alone, children were asked how many points they wanted to spend in order to do this, as a measure of their

motivation. The numbers of points spent according to each age group are shown in Table 13.

Table 13.

Mean and standard deviation number of points children spent, when they decided to play with someone or on their own, according to age group.

	Decision to play	
	With someone	On own
6 – 7 years	3.71 (3.20)	2.53 (3.20)
8 – 9 years	3.47 (2.36)	2.57 (3.30)
10 – 11 years	4.58 (1.73)	3.86 (3.23)
12 – 14 years	5.64 (2.40)	6.00 (2.06)

A 2 (decision: play with someone or on own) x 4 (age group) between-participants ANOVA was conducted on the number of points spent. There was only a significant main effect of age group, $F(3, 86) = 5.04$, $p=.003$, $\eta_p^2 = .15$. Polynomial contrasts revealed a significant linear trend ($p=.001$), with older children tending to spend more, regardless of their decision.

Children also completed the Friendship Motivation Questionnaire (Richard & Schneider, 1995). A one-way between-participants ANOVA was used to test for differences in friendship motivation between each age group, and found no significant age differences, $F(3, 88) = .93$, $p=.43$, $\eta_p^2 = .031$ (6-7 year-olds: $M = 35.81$ ($SD = 6.27$); 8-9 year-olds: $M = 37.48$ ($SD = 4.49$), 10-11 year-olds: $M = 36.22$ ($SD = 3.00$); and 12-14 year-olds: $M = 35.39$ ($SD = 3.54$)).

Reciprocity. Two aspects of reciprocity were examined: direct reciprocity (how children directly respond to others' offers), and expectations of reciprocity (children's expectations of reciprocity from others).

First, direct reciprocity was measured by giving children the opportunity to respond to offers from others (second move) and to give to others first (first move). Mean number of points shared during the first and second move, according to age group, are shown below in Figure 21. The mean number of points shared by the other player was 5 points.

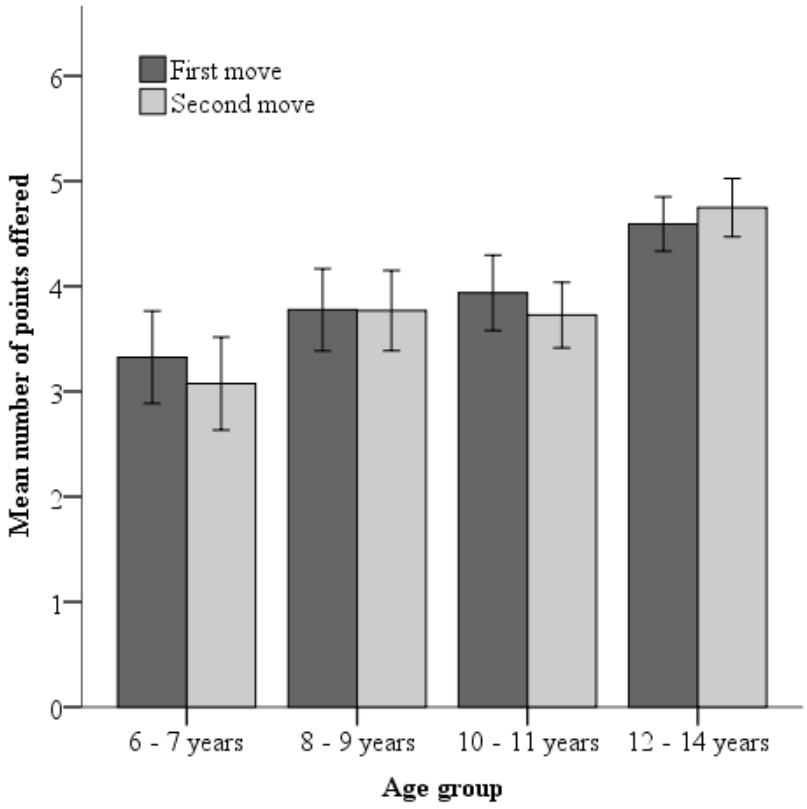


Figure 21. Mean number of points offered during the first and second move conditions, according to age group. Error bars indicate +/- one standard error.

To test for differences across age groups and between first and second moves, a 2 (move: first or second) x 4 (age group) mixed ANOVA was carried out on the mean number of points given. There was a significant main effect of age group, $F(1, 88) =$

3.10, p=.031, η_p^2 =.096. There were no other significant main effects or interactions (all ps>.56). To further analyse the main effect of age, one sample t-tests were used to test whether children responded fairly to the other's offer, by matching the average number of points offered to them – a fair offer of 5 points. 6-7 year-olds, 8-9 year-olds, and 10-11 year-olds all differed significantly in their offers by each giving less than 5 points (all ps<.003), but children aged 12 to 14 did not differ significantly from 5 points, $t(22)$ = .91, p=.37, r=.19, indicating that children of this age were fair.

The number of trials during the second move where children responded by punishing, rewarding or reciprocating the other player's offer was also calculated (Figure 22). Inspection of this figure suggests that most children responded to the other's offer by punishing (i.e., giving less than they had received themselves).

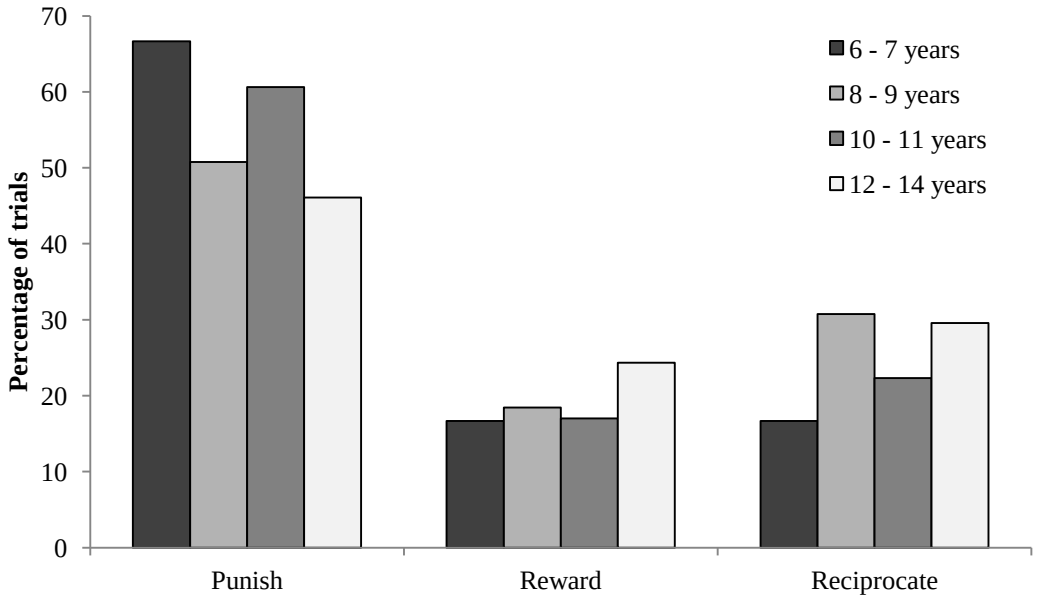


Figure 22. Percentage of trials during the second move condition where children punished, rewarded or reciprocated the offer they had been given during the second move.

The above data were analysed using chi-square to test for associations between response type and group. This analysis showed that there was a significant association between age group and response type, $\chi^2(6) = 14.01$, $p=.03$, $\varphi = .39$. This result is likely driven by 6 to 7-year-olds and 10 to 11-year-olds punishing on more trials, and 8 – 9-year-olds and 12 – 14-year-olds reciprocating on more trials.

Expectations of reciprocity. Children's expectations of reciprocity were tested by asking children to *offer* and *guess* how many points other players would give them under two conditions: a baseline condition where they were told they were giving at the same time as the other player, thus they could predict how many points the other would offer them (with no reciprocal intent), and a condition designed to test for expectations of reciprocity – where children were told to predict how many points the other player would give them *after* the other had found out the child's offer. If children expect reciprocity, then their offer and guess would be similar in this condition. Figure 23 below shows the mean results according to age group. From this figure, it appears that with age, children's offers and guesses become more similar, with young children predicting much higher offers from others than they themselves were prepared to offer, and older children anticipating the other's offer to be more related to their own offer, in particular in the expectations of reciprocity condition.

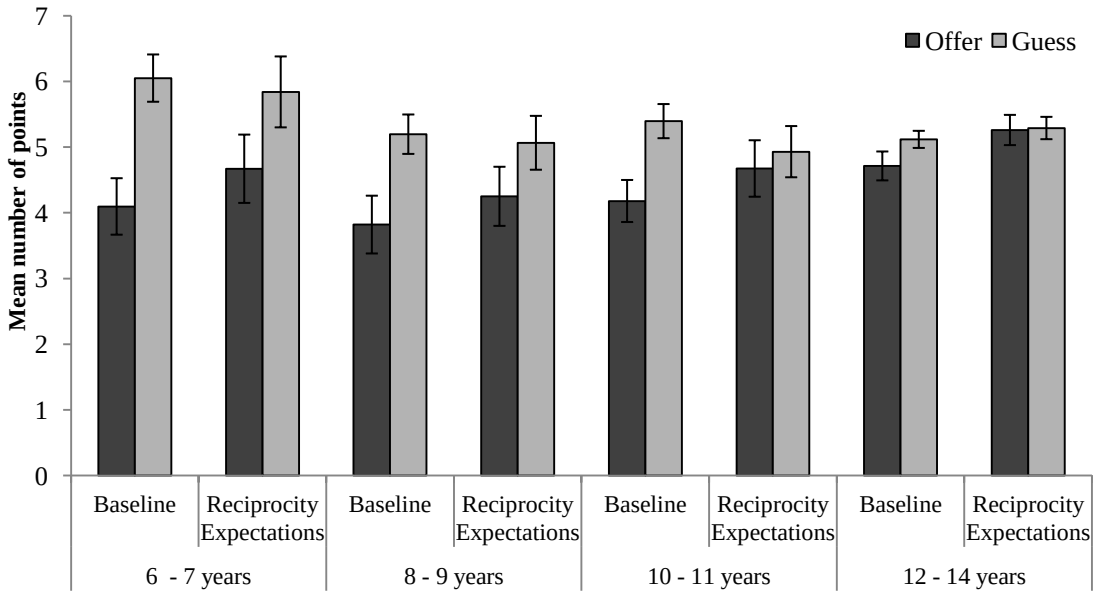
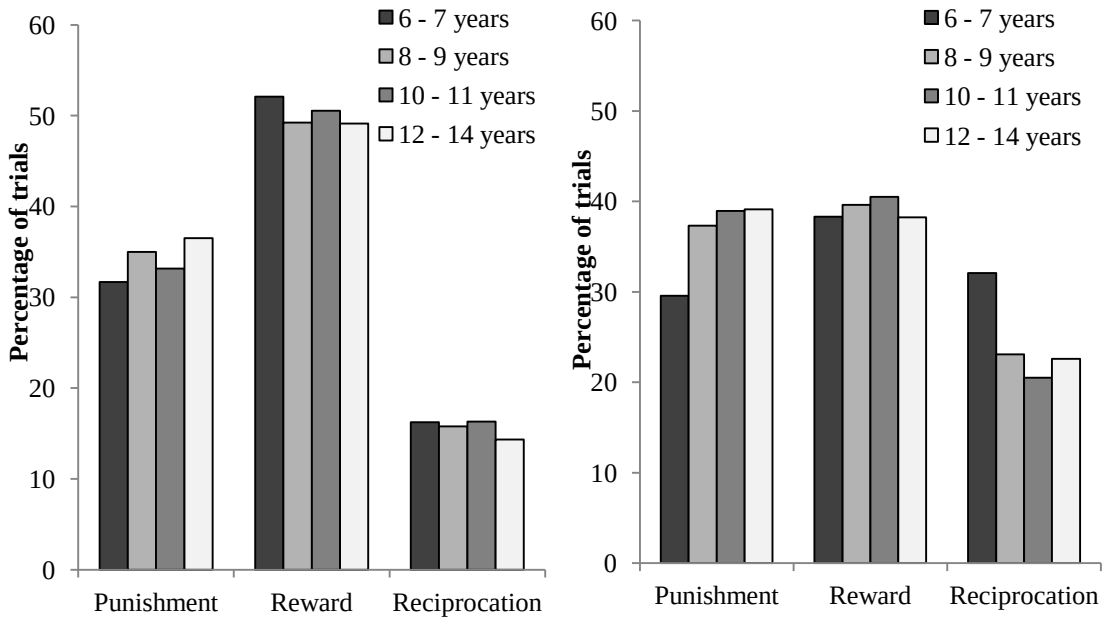


Figure 23. Mean number of points offered and guessed, according to age group, at baseline and in the expectations of reciprocity condition. Error bars indicate +/- one standard error.

To test for differences between baseline (predictions of generosity) and the expectations of reciprocity condition across age groups, a 2 (condition: baseline or expectations of reciprocity) x 2 (decision: offer or guess) x 4 (age group) mixed ANOVA was conducted on the number of points. This analysis revealed a significant main effect of decision, $F(1,88) = 14.74$, $p<.001$, $\eta_p^2 = .14$, with all children guessing that the other would offer more points to them than they themselves had offered the other. There was also a significant interaction between condition and decision, $F(1, 88) = 11.37$, $p=.001$, $\eta_p^2=.11$. All other main effects and interactions were not significant (all *p*s>.14). To further examine the interaction between condition and decision, planned contrasts using repeated measures t-tests were used to test for differences in offers and guesses between the conditions. There was no significant difference between guesses at baseline and the expectations of reciprocity condition, $t(91) = .92$, $p=.36$, $r=.10$. There was, however, a significant difference between offers

at baseline and offers in the expectations of reciprocity condition, $t(91) = 3.40$, $p=.001$, $r=.34$, such that offers were higher in the expectations of reciprocity condition.

In this task children's trial-by-trial responses were also considered – whether they thought the other player would punish, reward, or reciprocate with them at baseline (Figure 24A) and in the expectations of reciprocity condition (Figure 24B). Across all ages, it appears that children mostly predicted the other would reward them, followed by expectations of punishment. Reciprocation was the least predicted response across trials for all children, although there appears to be an increase in predicted reciprocity in the expectations of reciprocity condition.



A. Baseline B. Expectations of reciprocity

Figure 24. Percentage of trials with predictions of punishment, reward and reciprocation from other players at baseline (when giving at the same time; A) and in the expectations of reciprocity condition (when giving first to the other; B), according to age group.

To test for differences between the baseline and expectations of reciprocity conditions in terms of trial-by-trial responses, a three-way hierarchical loglinear analysis was conducted to assess the association between age group, condition (baseline or expectations of reciprocity), and response type (punish, reward or reciprocate). This analysis produced a best-fit model which included the two-way interactions, $\chi^2(17) = 46.77$, $p<.001$. Specifically, there was a significant main effect of response type, $\chi^2(2) = 176.45$, $p<.001$, a significant main effect of age group, $\chi^2(3) = 23.16$, $p<.001$, and a significant interaction between response and condition, $\chi^2(2) = 32.36$, $p<.001$. All other interactions and main effects were not significant, including the three-way interaction between age group, condition and response (all *p*s>.16). Figure 25 below shows the interaction between condition and response type. This figure suggests that the interaction is driven by an increase in expected reciprocation and a reduction in expected reward in the condition designed to measure expectations of reciprocity.

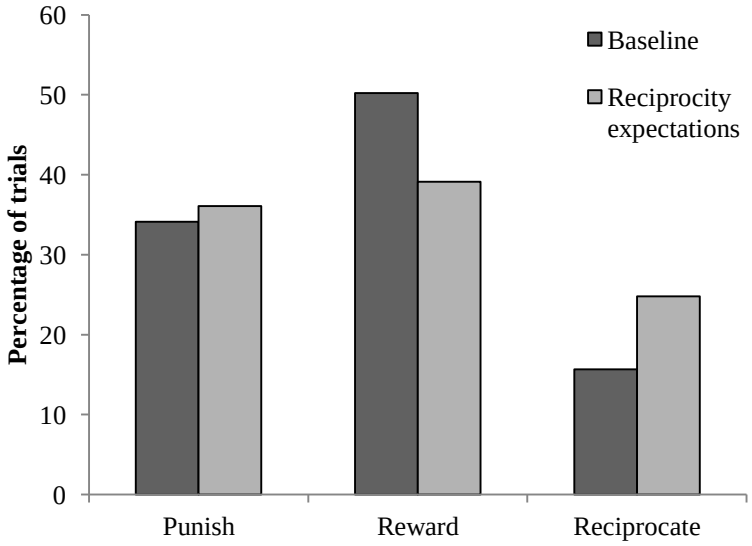


Figure 25. Percentage of trials where children (ignoring age group) expected the other to punish, reward or reciprocate in baseline and expectations of reciprocity conditions.

Inhibitory control. The go/no-go task was used to measure inhibitory control. Hit (the number of footballs correctly kicked) and false alarm (the number of rugby balls incorrectly kicked) rates can be seen below in Table 14.

Table 14.

Mean and standard deviations of percentages of hit and false alarm rates during the go/no-go task for each age group.

Age group	Mean hits (*SD*)	Mean false alarms (*SD*)
6 – 7 years	90.3% (7.57%)	39.7% (17.6%)
8 – 9 years	90.7% (6.19%)	40.7% (18.7%)
10 – 11 years	96.4% (3.33%)	31.2% (16.3%)
12 – 14 years	96.8% (4.03%)	28.2% (11.9%)

MANOVA was used to test for age-related changes on the hit and false alarm rates. There was a significant main effect of age group for both hits, $F(3, 87) = 8.73$,

p<.001, η_p^2=.23, and false alarms, F(3,87) = 3.31, p=.024, η_p^2=.10. Polynomial contrasts revealed significant linear trends in both hit rates (p<.001) and false alarm rates (p=.005), with hits increasing with age, and false alarms decreasing.

D prime (d') scores were calculated for each age group by using the hit and false alarm rates to calculate sensitivity to the stimuli. As shown in Figure 26, performance on this task generally improved with age.

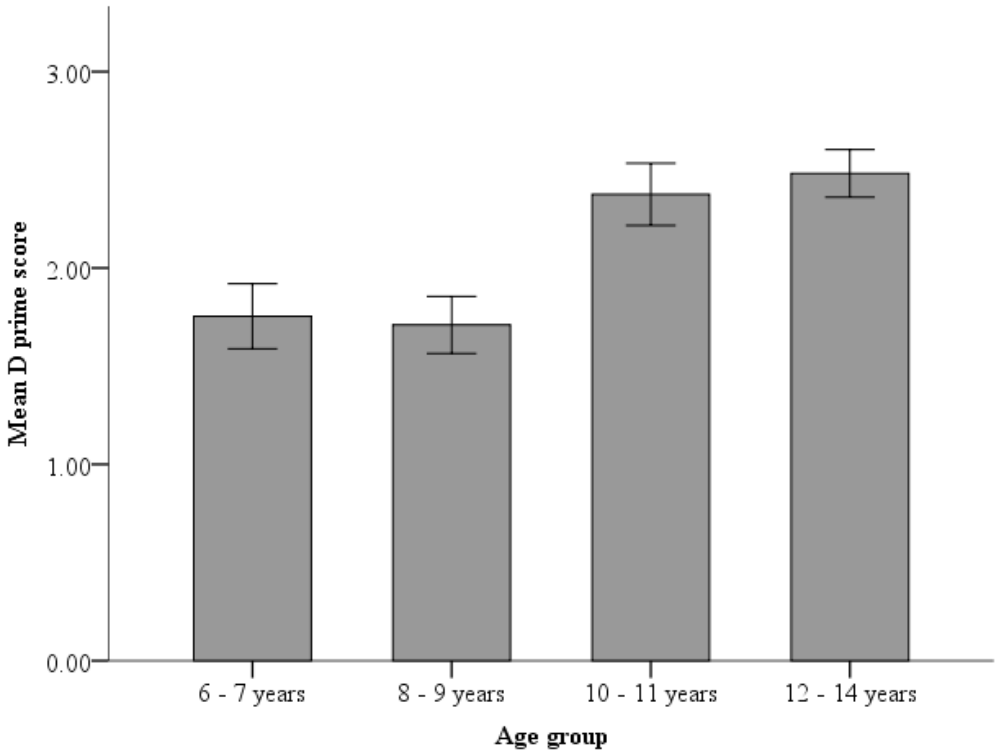


Figure 26. Mean d' scores across age groups in the go/no-go task. Error bars indicate +/- one standard error.

A one-way between-participants ANOVA was used to analyse group differences in d' scores. This analysis revealed a significant main effect of age group, F(1, 89) = 7.28, p<.001, η_p^2=.20. Polynomial contrasts confirmed that there was a significant linear trend, with d' scores increasing with age (p<.001).

4.3.2. Relationships between mechanisms and reputation management

The relationships between the tasks designed to measure the proposed mechanisms and explicit and implicit reputation management were examined to identify the contribution that these mechanisms might make to reputation management[3].

Correlation analyses. First, correlations between developmental variables (chronological age and verbal mental age) and the tasks designed to measure the proposed mechanisms of reputation management were tested, followed by partial correlations controlling for the effect of chronological age in order to remove any variance caused by age (Table 15). Given the number of correlations conducted, a conservative *p* value of .01 rather than .05 was used to test for significant correlations. Considering the developmental variables, there were significant positive correlations between chronological age and verbal mental age, ToM, and inhibitory control. There were also significant positive correlations between verbal mental age and ToM and inhibitory control. There were no correlations (raw or partial) between implicit reputation management and the tasks. For the explicit reputation management task, there was a significant positive correlation with ToM after controlling for chronological age. Taking into account correlations between tasks designed to measure the putative mechanisms, there was only a significant positive correlation between direct reciprocity and expectations of reciprocity.

[3] An outlier, identified in Chapter 3 with a high z-score for the observer effect (section 3.3), was removed from these analyses.

Table 15.

Raw correlations between explicit and implicit reputation management tasks and the tasks tapping the proposed mechanisms, with partial correlations controlling for chronological age in parenthesis.

	Chronological age	Verbal mental age	Implicit reputation management	Explicit reputation management	Theory of Mind	Friendship Motivation	Social reward choice	Inhibitory control	Direct reciprocity
Verbal mental age	.93**								
Implicit reputation management	.15	.15							
Explicit reputation management	-.088	-.052	-.042 (-.030)						
Theory of Mind	.49**	.55**	-.005 (-.089)	.20 (.29*)					
Friendship Motivation	-.038	-.046	.14 (.14)	.001 (-.004)	.092 (.13)				
Social reward choice	-.17	-.19	.084 (.11)	.17 (.15)	-.21 (-.15)	-.010 (-.017)			
Inhibitory control	.38**	.35**	.049 (-.007)	.044 (.083)	.20 (.018)	.10 (.12)	-.16 (-.11)		
Direct reciprocity	.13	.21	.063 (.046)	.11 (.13)	.18 (.14)	.046 (.051)	-.12 (-.096)	-.091 (-.15)	
Expectations of reciprocity	-.10	-.010	.026 (.042)	-.009 (-.018)	.007 (.066)	-.042 (-.046)	.079 (.062)	-.046 (-.008)	.31* (.33*)

Note. *p<.01, **p<.001

Regression analyses. Regression analyses were conducted to determine which mechanisms could explicit reputation management, given the suggestion of the above correlational analyses that some of the proposed mechanisms could contribute to this form of reputation management.

Logistic regression was used to test whether any of the mechanisms could predict children's decision to save when bottom of the leader board (binary choice: 'yes' or 'no' to saving position; explicit reputation management). The following variables were entered into the model: chronological age, verbal mental age, theory of mind (mental state stories score), friendship motivation score, social reward choice, inhibitory control (d' score), direct reciprocity (number of matched trials during the second move) and expectations of reciprocity (number of trials where the child predicted reciprocity in the expectations of reciprocity task). The model could correctly classify 64.2% of cases. This result, however, did not classify cases significantly better than the constant alone, $\chi^2(8)= 5.73$, $p=.68$. Table 16 shows the predictors and indicates significant predictors of explicit reputation management.

Table 16.

Logistic regression predicting explicit reputation management from potential underlying mechanisms.

Predictor	B	Wald χ^2	*p*	Odds ratio
Chronological age	-.17	.35	.56	.84
Verbal mental age	-.08	.11	.74	.92
Theory of Mind	.34	5.88	.015*	1.4
Friendship Motivation	-.02	.14	.71	.98
Social reward choice	-1.18	4.43	.035*	.31
Inhibitory control	.43	1.29	.26	1.53
Direct reciprocity	.30	2.44	.12	1.34
Expectations of reciprocity	-.095	.77	.38	.91

Note. *$p<.05$

Theory of mind and social reward choice were significant predictors of explicit reputation management. As theory of mind scores improved, the odds of saying "no" to saving when bottom of the leader board increased by 1.40. For social reward choice (whether children wanted to play with someone or on their own), the odds of a child saying "yes" to saving was .31 higher than for those who wanted to play with someone.

4.4. Discussion

The current study investigated several mechanisms which could potentially underlie implicit and explicit reputation management, specifically theory of mind, social motivation, expectations of reciprocity and inhibitory control. Understanding of these mechanisms and their contribution to reputation management could explain why implicit and explicit management appear to have distinct developmental trajectories. First, there were some age-related changes in the tasks tapping each of the

mechanisms, and second, there were a number of interesting relationships between the proposed mechanisms and explicit reputation management, specifically theory of mind and social motivation. None of the proposed mechanisms appeared to underpin implicit reputation management

4.4.1. Age-related changes in the proposed mechanisms

First, as expected, developmental improvements were noted in theory of mind ability. Second-order ToM was measured using the Strange Stories (Happé, 1994; White et al., 2009a), and children performed better on the mental state than nature stories. This finding supports evidence for a continued development of meta-cognitive ability throughout childhood and into adolescence (Weil et al., 2013). Inhibitory control, as measured by the go/no-go task, also improved with age. As children got older, they became more accurate in detecting the stimulus, supporting previous research (Best & Miller, 2010).

There were several interesting findings concerning the measures of social motivation. There were no age-related differences in children's reported friendship motivation using Richard and Schneider's (2005) Friendship Motivation Questionnaire, who also did not find differences in age on this measure. This finding suggests that motivation for friends may be relatively stable throughout development. As children reach adolescence, though, peer relationships are known to become increasingly important and rewarding (Hartup, 1993). The questionnaire measure may have only been sensitive for examining the underlying motivations for having friends (e.g. to have others to talk to) but may not directly test the reward value children assign to their friendships.

This study involved another measure of social motivation which may test reward value more directly, whereby children were given the choice of either playing alone or with someone. There were some subtle age-related differences between children in this ecologically valid measure of social motivation. Notably, children aged 6 to 7 preferred to play on their own, whereas children aged 8 to 9 preferred to play with someone. Children aged 10 to 14 showed no distinct preference in their choice. With age, children spent more to points to make either decision. These preferences reflect differences in social reward choices across childhood, with 8 to 9-year-olds finding the opportunity to play with someone a particularly rewarding incentive, whereas younger children preferred to play on their own. There may be a shift around 8 years from egocentric thinking to more consideration of others (Fehr et al., 2008) which may link to this shift in social desire. After the age of 10, children showed no distinct preference for choosing to play on their own or with someone. This could reflect individual preferences for social contact – if the social reward had been to play with a specific friend, results may have reflected the increased value of friendships in adolescence (Jankowski, Moore, Merchant, Kahn & Pfeifer, 2014). The increase in the number of points spent could either reflect that older children were more motivated to pay more to guarantee their decision, or that older children could assign a different value to the points.

In the novel reciprocity tasks, children became more generous with age, supporting previous research testing sharing using the dictator game (Gummerum et al., 2008; Harbaugh, Krause, & Liday, 2003; Malti, Gummerum, Keller, Chaparro, & Buchmann, 2013). An increase in generosity with age has been suggested to be related to older children being more concerned for fairness, reciprocity and reputation (Malti et al., 2013). It was not until children were aged 12 to 14 in the

current study that they were fairer during the second move by sharing half of their points with the other player. However, little reciprocal behaviour was noted across all of the reciprocity tasks: even when predicting how others would respond to their own offers, most children predicted the other would be more generous to them than they themselves were prepared to be. When children were giving first to the other player – who would then subsequently know how many points they had been given before making their own offer – children changed their behaviour by increasing their offers to the other. This result suggests that children attempted to encourage reciprocity in the other player by increasing their own offers, demonstrating an awareness of reciprocal principles, namely that the other player would be more likely to reciprocate a higher offer.

The reciprocity results support previous research suggesting that children have an understanding of reciprocity from around the age of five (House et al., 2013; Berndt, 1977). However, as noted, children were not particularly reciprocal, and did not behave fairly until they reached 12-years-old. This finding may support the idea that children may have knowledge of the key principles underlying reciprocity, such as equality and fairness, but they often do not act in accordance with this knowledge (Blake et al., in press; Sheskin et al., 2014), even though they are aware that they are not acting how they should be (Smith et al., 2013). Other authors have also noted a relatively protracted development of social decision-making. For example, van den Bos, Westernberg, van Dijk and Crone (2010) noted that adolescents tend to become more prosocial, trusting, and reciprocal with age, findings they ascertained to be related to better perspective-taking ability, and greater understanding that friendships are more likely to be maintained if favours are returned. Further work by van den Bos, van Dijk, Westenberg, Rombouts, and Crone (2011) has shown that younger

adolescents were more egocentric and thus less sensitive to other players' perspectives in economic games, with resultant increases in prosociality with age.

Other aspects of social decision-making also do not appear to develop until adolescence, such as fairness, whereby it is not until children reach early adolescence that they begin to be motivated by fairness (Overgaauw, Güroğlu & Crone, 2012), and it is not until 12 years that children show an understanding that others have intentions behind fair acts (Güroğlu, van den Bos, & Crone, 2009). This research supports the above finding that children in this study were not fair until 12-years-old. These shifts could be underpinned by greater understanding of social norms in addition to perspective taking (Overgaauw et al., 2012). The current study did not note a relationship between ToM ability and reciprocity, indicating that norm learning may have contributed to reciprocal behaviour in the current study. Arguably, an increased sensitivity to reputation with age could also contribute to the seemingly protracted development of reciprocity, given the suggested link between fairness and reputation (Nowak, Page & Sigmund, 2000), with older children learning social norms (such as fairness and reciprocity) and managing reputation in accordance with this (Hepach et al., 2012). Another possible explanation for the shifts in understanding of reciprocity – where children aged around 10 to 11 years appear to develop an expectation of reciprocity (as shown in Figure 23) – could relate to Piaget's (Inhelder & Piaget, 1958) concepts of concrete and formal operations, whereby children shift from applying logical thought to concrete objects to more abstract and systematic thinking from around the age of 11. This abstract thinking could help children to have a greater appreciation of concepts such as reciprocity.

4.4.2. Relationships between mechanisms and reputation management

The current study also attempted to elucidate whether any of the above measures could contribute to variation in the development of implicit and explicit reputation management. Implicit reputation management is thought to consist of subconscious behaviour changes in the presence of others, while explicit reputation management is a more deliberate, conscious effort to manage one's reputation (Shaw et al., 2013). The current study is the first of its kind to attempt to understand reputation management by considering the potential underlying mechanisms that may contribute to the development of these two forms of reputation management. A number of analyses were conducted to examine and clarify the contribution of the proposed mechanisms.

Correlation analyses suggested that none of the suggested mechanisms could predict implicit reputation management. The lack of significant correlations is not surprising given the overall lack of implicit reputation management across age groups, as reported in Chapter Three, although there was some indication that adolescence may mark a time of increased implicit reputation management. During early adolescence (from the onset of puberty, around age 12; Yousefi et al., 2013), children are gradually thought to become more sensitive to the thoughts and perspectives of others, which could tap into a greater sensitivity to reputation (Blakemore & Mills, 2014; Somerville, 2013; Sebastian et al., 2008; Somerville, 2013; van den Bos et al., 2011). However, van den Bos et al. (2011) found that young adolescents still behave relatively egocentrically in economic games, and suggest that prosocial behaviour does not become automatic until mid-adolescence. Implicit reputation management, as a potential cause of prosocial behaviour, may have a relatively protracted and continued development into adolescence. The putative mechanisms should therefore

be tested in mid to late adolescence before they can be ruled out as mechanisms for implicit reputation management.

Correlation analyses did reveal a significant relationship between explicit reputation management and theory of mind after controlling for age. In the explicit reputation management task, those with better ToM skills may be more aware that others could judge their performance if they were to save their low leader board position. This finding supports previous research purporting ToM to be an important mechanism for reputation management (Amodio & Frith, 2006; Izuma et al., 2011; Izuma et al., 2010) and previous research noting that children with better ToM ability had better knowledge of self-presentational motives (Banerjee and Yuill, 1999). Finally, there was a significant correlation (including after controlling for age) between direct reciprocity and expectations of reciprocity. This relationship likely confirms that these tasks were testing the underlying principle of reciprocity, and those who behaved more reciprocally had higher expectations of reciprocity. Hoffman, McCabe and Smith (1994, 1996) suggest that children who are more generous in economic games have higher expectations of reciprocity driven by experiences with others. Further, Hoffman et al. (2008) suggest that reciprocity promotes cooperation and those who are more reciprocal thus expect reciprocity in return.

Logistic regression further confirmed that ToM and social motivation could predict explicit reputation management. First, those who said "no" to saving when bottom of the leader board were more likely to have better ToM scores, supporting previous analyses and the suggestion that the ability to think about others' minds is related to the ability to manage reputation when it is explicitly at risk. Second, those who said "yes" to saving when bottom of the leader board were more likely to want to play with someone than alone. Notably, this finding is contrary to the hypothesised

relationship between social motivation and reputation management – that those with greater social motivation would be more motivated to protect their reputation (Chevallier et al., 2012b). Rather, this finding could reflect a general desire for social contact, with children who are more socially motivated preferring to share information with others, regardless of its valence.

4.4.3. Limitations and future directions

Interestingly, inhibitory control appeared to have little role in reputation management and did not relate to any of the other proposed mechanisms. One possible explanation for this result is that inhibitory control may not impact upon reputation management in the proposed manner (by inhibiting behaviours which could be detrimental to reputation) until later on in adolescence. For example, Steinberg (2010) demonstrated that the ongoing development of self-control and increased reward-seeking behaviours contributed to the likelihood of risk-taking in mid-adolescence. It may be the case that inhibitory control has a greater contribution to reputation management only later on in development.

Adolescence has been noted to be of particular import for the development of reputation management, both in the current study and elsewhere (e.g. Sebastian et al., 2008). Further study to confirm this hypothesis is needed though, by extending the age groups to include older adolescents and young adults (e.g. from 12 to 21). The current tasks could be used to confirm the earlier proposition (Chapter Three) that implicit reputation management has a protracted development, and that perspective taking ability could contribute to this (van den Bos et al., 2010, 2011), as well as greater understanding and following of social norms, such as reciprocity and fairness

(Overgauuw et al., 2012), and better self-control (Steinberg, 2010). The structure and design of the current study could therefore be applied to the study of reputation management in adolescence.

Overall, the current study noted that the mechanisms that appeared to contribute to reputation management were theory of mind and social motivation – although the impact of these mechanisms impinged only on individual differences found in explicit reputation management. Considering the distinction between implicit and explicit reputation management, Chapter Five will test these forms of reputation management in children with autism. This approach may be particularly interesting given the suggestion that autistic individuals may have preserved explicit but not implicit ToM ability (Frith & Frith, 2008a) – therefore, this distinction could also be applied to reputation management in autism, as previously suggested in Chapter Two. Further, Chapter Six will examine the mechanisms contributing to reputation management in children with autism, who are thought to have difficulties with thinking about others' minds (Baron-Cohen et al., 1985) and social motivation (Chevallier et al,. 2012a) – two mechanisms which have been identified as contributing to reputation management in typical development in the current study. However, further research is needed to clarify whether the same or different cognitive processes underpin behaviour (in this case, reputation management) in children with autism (Karmiloff-Smith, 2009).

Chapter Five

Reputation management in children with autism

5.1. Introduction

Chapter Two presented evidence that autistic adults have the ability to manage reputation, but a reduced propensity to do so: therefore, adopting a developmental approach could help to enhance our understanding of this phenomenon in autism, and further inform the under-researched area of autistic children's susceptibility to social influence.

In typical children, researchers have proposed that social influence could trigger prosocial behaviours (Sebastian-Enesco et al., 2013). Children with autism are also capable of acting in a prosocial manner (Downs & Smith, 2004; Liebal et al., 2008; Sally & Hill, 2006), however, the extent to which prosocial behaviour in autism is driven by social influence is unknown. Recent evidence indicates that children with autism may be less susceptible to social influence: in a child-friendly version of Asch's (1956) classic line-judgement paradigm, autistic children were less influenced by information about other individuals' line judgements (Yafai et al., 2013). However, it could be argued that Yafai et al. (2013) did not sufficiently test social influence, since rather than using the real presence of a person, they simply told children which line "the majority of people" had selected. By testing whether children with autism change their behaviour in front of a peer, these conditions would lend themselves to more valid evidence of social influence (or lack thereof).

Children with autism can be aware of the reputations of other people: for example, they can judge the behaviour of morally "naughty" and "nice" protagonists in story vignettes (Blair, 1996). Yet, while typical children tended to cooperate more with "nice" protagonists, autistic children did not utilise this information in a prisoner's dilemma game (Li, Zhu & Gummerum, 2014). As such, it appears that children with

autism may have difficulty with appropriately utilising information about an individual's reputation to moderate their own behaviour. There is also currently mixed evidence as to whether children with autism are aware of their *own* reputation. Chevallier et al. (2012b) tested whether children with autism would flatter an experimenter when informed that a drawing they had previously seen had been drawn by this experimenter. While typical children increased their rating of this drawing, allegedly to manage their reputation, autistic children did not, thus Chevallier et al. (2012b) interpreted this as evidence for a lack of reputation management in children with autism.

Research into self-presentational skills, however, suggests that autistic children may have some preserved reputation management ability. Self-presentation is the ability to present oneself in a certain light (Banaji & Prentice, 1994), a skill needed in order to manage one's reputation. In Begeer et al.'s (2008) study, autistic and typical children could win a prize by describing why they deserved to win the prize. Like typical children, autistic children used more positive self-statements in this condition, compared to when they were just asked to describe themselves. However, children with autism were less strategic in their self-descriptions. These findings were replicated and extended by Schereen et al. (2010), who also noted that children with autism found it harder to target their self-descriptions to specific audiences. Schereen et al. (2010) suggested that autistic children may be less skilled in their self-presentation ability as they have a lessened propensity to lie, and therefore to exaggerate or make up facts about the self to gain prizes.

It seems plausible from self-presentation research in autism (Barbaro & Dissanayake, 2007; Begeer et al., 2008; Scheeren et al., 2010) that autistic children may be able to manage their reputation under certain circumstances. Accordingly, reputational

incentives could be salient for children with autism. One possible reputational incentive for children with autism is friendships. Several studies investigating autistic children's friendships suggest that many do desire friendships (Bauminger et al., 2003; Daniel & Billingsley, 2010; Locke et al., 2010), are satisfied with their friendships (Calder et al., 2013), and are interested in and initiate social contact (Frith, 2003). However, children with autism tend to have fewer friends than their typical counterparts and the quality of friendships are often found to be qualitatively different for autistic children. For example, in a meta-review of 24 studies, Petrina et al. (2014) noted that autistic children perceived lower levels of companionship, intimacy and closeness in comparison to their typical peers. Finally, there seems to be great variation between autistic children in the extent to which children want social contact – for example, some prefer to be alone (Calder et al., 2013). Autistic children who do want friends may be more likely to think about their reputation, and differences in friendship quality could be linked to the ability to effectively manage reputation and thus obtain desired friendships.

Overall, the above findings suggest that children with autism do not *implicitly* manage their reputation, but that the ability to *explicitly* do so may be preserved, although they may be less skilled in this ability. In other words, autistic children may not subtly and automatically alter their behaviour in order to manage reputation, but there may be situations where they are aware that their reputation is at stake, and they may attempt to protect it in such instances. This suggestion corroborates with the findings of Chapter Two with autistic adults, who did not implicitly manage reputation but were able to manage reputation when it was more explicitly at risk. The current study therefore tested whether children with autism have the ability to implicitly or explicitly manage their reputation, utilising the same methods as

detailed in Chapter Three. Specifically, to measure implicit reputation management children with autism completed several one-shot dictator games once when observed and once when unobserved. To measure explicit reputation management, they were given the opportunity to protect their reputation when they came bottom of a leader board.

5.2. Method

5.2.1. Participants

Sixty-six children aged from 7 to 14 years took part in the current study (Table 17). Typical children (n = 33) were selected from the sample of children who took part in Chapters Three and Four (conducted concurrently with the current study) and matched to autistic children (n = 33) on chronological age, $t(64) = 1.42$, p=.16, r=.17, and verbal mental age, $t(64) = .37$, p=.71, r=.05, given that language ability was required for many of this study's tasks. Children were matched on verbal mental age (calculated by dividing chronological age by 100 and multiplying this by verbal IQ score as measured by the WASI-II (Wechsler, 2011)) since it gives a sense of a child's developmental level and functioning, and can control for differences in developmental rates between typical and autistic children (Burack, Iarocci, Flanagan & Bowler, 2004; Burack, Pastò, Porporino, Iarocci, Mottron & Bowler, 2001). An additional six children with autism who had a verbal mental age more than 3 years lower than their chronological age were excluded from the sample. This cut-off was used since none of the typical children showed a discrepancy as large as this between chronological age and verbal mental age. Therefore, the current sample consisted of autistic children who would be considered cognitively-able or "high-functioning". Although the typical group had a higher proportion of girls than the autism group, chi

square confirmed that the gender ratio was not significantly different between the groups, $\chi^2(1)=2.75$, $p=.097$, $\varphi = .20$.

Table 17.

Descriptive statistics for chronological age, verbal mental age, Social Communication Questionnaire (SCQ) score and Autism Diagnostic Observation Schedule – 2nd edition (ADOS-2) scores.

		Group	
		Typical	Autism
N		33	33
Gender (M : F)		21 : 12	27 : 6
Chronological age (in years)	*M* (*SD*)	10.24 (2.00)	10.96 (2.11)
	Range	6.92 – 14.21	7.18 – 14.32
Verbal mental age in years	*M* (*SD*)	10.52 (2.28)	10.31 (2.35)
	Range	5.74 – 14.50	6.15 – 15.31
SCQ	*M* (*SD*)	4.67 (3.63)	23.88 (6.62)
	Range	0 – 14	11 – 38
ADOS overall score	*M* (*SD*)	-	10.62 (3.33)
	Range	-	7 – 19

Note. Higher ADOS scores reflect greater severity of autism symptoms.

Autistic children were recruited through autism resource provisions attached to primary and secondary schools in London and community contacts. Autistic children all had an independent clinical diagnosis of an Autism Spectrum Condition and completed the Autism Diagnostic Observation Schedule – 2nd edition (ADOS-2; Lord et al., 2000) which showed that children were above the cutoff score of 7 for a diagnosis of an Autism Spectrum Condition. Parents of both autistic (n = 24) and

typical (n = 27) children completed the Social Communication Questionnaire (Rutter, Bailey, Berument, Lecouteur, Lord & Pickles, 2003) to ensure that none of the typical children were above the cut off for autism (a score of 15) and that autistic children were above this cutoff. One child with autism was below this cutoff, but was retained in analyses since he had a clinical diagnosis of Asperger's syndrome, met criteria on the ADOS, and his removal from the sample did not alter the results.

5.2.2. Design

The current study had a between-participants design, with the independent variable of group (autism or typical). The dependent variables for the explicit and implicit tasks are outlined below.

5.2.3. Materials and Procedure

The current study used identical methods to those outlined in Chapter Three, and are described in detail in section 3.2.3. In the implicit reputation management task, children completed 20 one-shot dictator games: 10 when observed and 10 when unobserved. Children were considered to have implicitly managed their reputation if they increased the number of points they shared when observed. In the explicit reputation management task, children played computer games and were then given the opportunity to view their position on a leader board. They were then asked whether they wanted to save or to not save their position. Children were considered to have protected their reputation when it was explicitly at risk if they chose *not* to save their position when bottom of the leader board, thus preventing others knowing about their poor performance.

5.3. Results

Implicit reputation task. Figure 27 shows the mean number of points children shared when observed and unobserved.

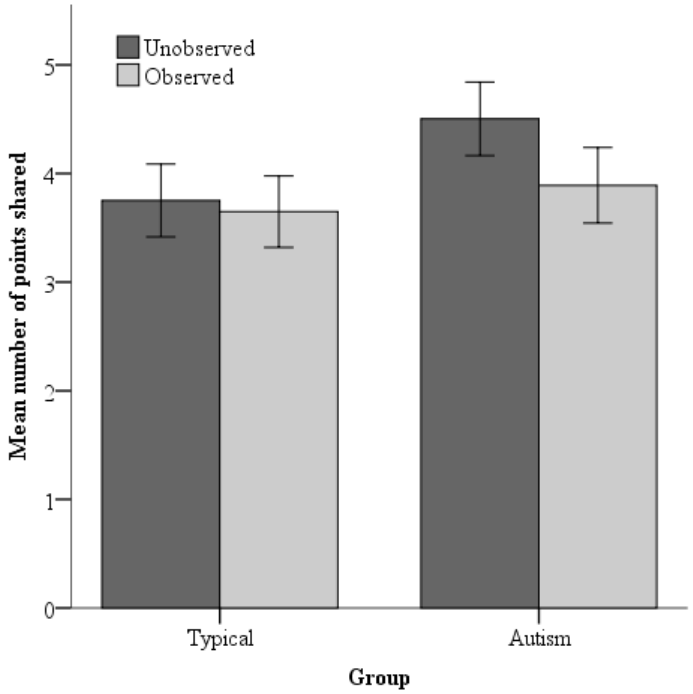


Figure 27. Number of points shared in the implicit reputation task by typical and autistic children when observed and unobserved. Error bars indicate +/- one standard error.

The observer effect, which quantifies the effect of being watched, was calculated by subtracting the number of points shared when unobserved from the number of points shared when observed. Figure 28 shows box plots demonstrating the distribution of observer effects for each group. A one-way between-participants ANOVA was used to test for differences between typical and autistic children. This analysis showed that there was no significant main effect of group, $F(1, 64) = 2.24$, $p=.14$, $\eta_p^2 = .034$. No further analyses were conducted.

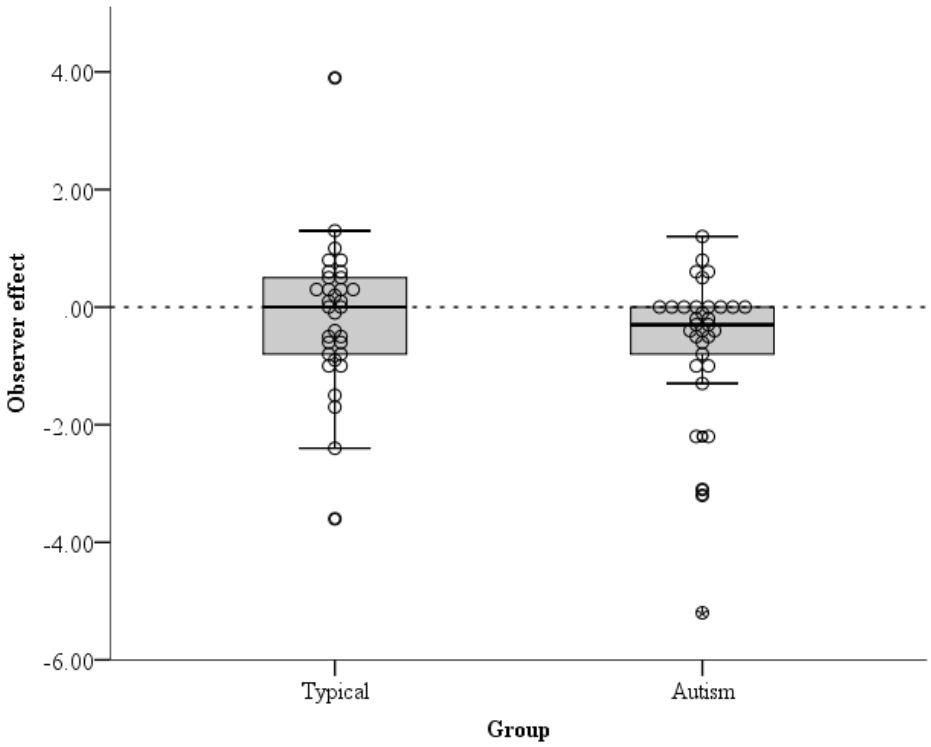


Figure 28. Box plots showing the distribution of the observer effect (the difference score between observed and unobserved conditions), for both typical and autism groups. The dotted line represents no difference between being observed and unobserved (i.e. no observer effect).

Explicit reputation task. In this task, children had the opportunity to protect their reputation. The number of children in each group deciding to save (or not to save) their position on the leader board, when either placed top or near the bottom, is shown below in Table 18. Some children from each group chose not to see the leader board at all: when top of the leader board, one typical child and three autistic children opted not to view the leader board. When bottom of the leader board, one typical and two autistic children decided not to view the leader board.

Table 18.

Number of children deciding to save or not to save their leader board position depending on whether they appeared top or bottom of the leader board.

	Position			
	Top of leader board		Bottom of leader board	
Save?	Yes	No	Yes	No
Typical	31	1	12	20
Autism	28	2	17	14

Considering decisions when top of the leader board, the majority of typical children (96.9%) and autistic children (93.3%) wanted to save their position. Binomial tests showed that both groups were significantly above chance for saying "yes" to saving when top of the leader board (both *p*s<.001). Fisher's Exact Test (used since some cells had a count less than 5) showed that there was no association between group and decision to save when top of the leader board, p=.61. When they appeared bottom of the leader board, 62.5% of typical children and 45.2% of autistic children did not want to save their position. Binomial tests revealed that both groups showed no distinct preference for whether they saved their score when bottom of the leader board (both *p*s>.22). Chi-square analysis was used to test whether there was an association between group and decision to save, however this was not significant, $\chi^2(1) = 1.91$, p=.18, φ =.17.

Fisher's Exact Test was also used within groups to test for an association between leader board position and decision to save. For both typical and autistic children there was a highly significant association (both *p*s<.001). This result indicated that all children were more likely to save their position when top of the leader board.

Children had to spend between 0 and 10 points in order to save (or not to save) their position on the leader board. Table 19 shows the number of points spent by each group according to their decision.

Table 19.

Mean (SD) number of points children in each group decided to pay following their decision to save or not to save their leader board position when top and bottom of the leader board.

		Position			
		Top of leader board		Bottom of leader board	
Save?		Yes	No	Yes	No
Typical	*M* (*SD*)	5.06 (3.20)	5.00(.00)	2.50 (2.71)	2.85 (3.30)
	Range	0 – 10	-	0 – 8	0 – 10
Autism	*M* (*SD*)	6.75 (3.22)	.50 (.71)	5.24 (3.62)	3.86 (3.86)
	Range	0 – 10	0 – 1	0 – 10	0 – 10

Given that when they appeared top of the leader board, only one typical child and two autistic children decided not to save their score, the following analysis was conducted only on responses to appearing bottom of the leader board. A 2 (group: typical or autism) x 2 (save: yes or no) between-participants ANOVA was carried out on the number of points children decided to spend. There was a significant main effect of group, $F(1, 59) = 4.54$, $p=.037$, $\eta_p^2 = .071$, such that autistic children spent more points, regardless of the decision to save or not when bottom of the leader board. All other main effects and interactions were not significant (all *p*s>.33).

5.4. Discussion

The current study aimed to examine whether children with autism would manage their reputation. As predicted, children with autism did not implicitly manage their

reputation. When reputation was more explicitly at risk, some – but not all – autistic children decided to protect their reputation, which suggests that there may be wide variability in explicit reputation management in autism. Crucially, similar findings were found in typical children. They did not manage their reputation in an implicit situation, and there was no difference between the two groups in terms of explicit reputation management.

Previous research testing implicit reputation management in children with autism found that they did not manage their reputation, but typical children did (Chevallier et al., 2012b). The methodology of Chevallier et al.'s (2012b) study, however, differed markedly to that of the current study. Typical children in their study demonstrated reputation management by increasing ratings of a drawing that the experimenter claimed that she had drawn herself. In the current study, children were observed whilst playing dictator games with players in an online gaming world – arguably a more subtle situation for one to be concerned about reputation. Interestingly, neither autistic nor typical children were sensitive to observation in this situation. In Chapter Three, I argued that the lack of implicit reputation management noted in typical children was due to a protracted development of this ability, which does not emerge until adolescence. However, it seems unlikely that the lack of implicit reputation management is due to a protracted development in autism, given the fact that autistic adults also do not implicitly manage reputation (Chapter Two). Chapter Six will consider whether any of the previously proposed mechanisms can explain this result.

In the explicit reputation task, where children had the opportunity to protect their reputation, there was a tendency for some of the autistic children to choose to protect

their reputation. These findings are in line with research conducted on autistic children's self-presentation skills, which suggests the ability to attempt to present oneself in a certain way is possible in autism (Begeer et al., 2008; Schereen et al., 2010). Indeed, not all children in both groups wanted to protect their reputation, supporting the possibility of wide-ranging individual differences within reputation management. Nonetheless, it appears that some autistic children can be aware when their reputation is explicitly at stake, but more research is needed to differentiate between children who do and do not want to protect their reputation, as Chapter Six intends to examine.

The explicit reputation management task, though, may not reflect real-life scenarios for autistic children, which may explain their continued social difficulties in everyday life. Indeed, the findings suggest that children with autism can be *aware* that their reputation is at risk, and they can take a simple step of preventing others knowing about this in a computer game. Real-life explicit reputation management is likely to be more complicated, and indeed Begeer et al. (2008) and Schereen et al. (2010) both note that while autistic children can present themselves in a certain light, they do so with less skill. Nonetheless it is important to consider this gap between knowledge of reputation and reputation management in action, supporting the idea that autistic individuals may be aware of reputation, but struggle with the social skills needed to effectively manage it, in particular to do so automatically. The following chapter will consider the underlying mechanisms which may explain *why* there is a gap between knowledge and action.

5.4.1. Limitations and future directions

One possible limitation relates to the implicit reputation management task. It could be argued that an older age range should have been used, given the suggestion that implicit reputation management may not appear until later in adolescence (Chapter Three). However, the current study was run concurrently with those described in Chapter Three and Four, and based on the scant research examining reputation management in children, there were theoretically sound reasons to assume that implicit reputation management would be present from a young age in typical individuals (Engelmann et al., 2012; Leimgruber et al,. 2012; Shaw et al., 2014). Further, explicit reputation *was* noted to emerge from 8 years of age, and the current study suggests that some autistic children can explicitly manage reputation from around this age, just like typical children of similar verbal mental age. Given the fact that adults with autism do not appear to implicitly manage their reputation (Chapter Two; Izuma et al., 2011) one assumes that adolescents with autism would not implicitly manage their reputation either. Nonetheless, experimental research is clearly needed to support this claim and to consolidate the findings with children and adults.

Overall, the current study supported the hypothesis that autistic children would explicitly manage their reputation, but not implicitly manage it. In terms of social influence, the results suggest that autistic children may be less susceptible to being automatically or subconsciously influenced, but they are *not* immune to explicit awareness that their behaviour could be judged by others. However, there were individual differences in explicit reputation management in autism, with some, but not all, autistic children taking steps to influence what others know about them. To understand these individual differences in greater detail, Chapter Six will attempt to

identify the source of this variability by testing whether several potential mechanisms – theory of mind, social motivation, expectations of reciprocity, and inhibitory control – underlie reputation management in autism.

Chapter Six

Mechanisms underpinning reputation management in children with autism

6.1. Introduction

The results of Chapter Five showed that children with autism did not manage their reputation when the demand to do so was implicit. When the demand was explicit, however, some (but not all) autistic children engaged in reputation management, suggesting that there is variation in this ability. It is not clear why children with autism respond differently to implicit and explicit demands to manage their reputation and if these demands are different to typical children. The current study therefore aimed to investigate how different mechanisms contribute to explicit and implicit reputation management in autism. In Chapter Four, theory of mind and social motivation were identified as variables which contribute to explicit reputation management in typical development. The current study tested whether these mechanisms, as well as expectations of reciprocity and inhibitory control, impinge on reputation management in autism.

Two main hypotheses have previously been proposed to explain why autistic individuals have difficulties with reputation management: first, the theory of mind hypothesis (Baron-Cohen et al., 1985; Izuma et al., 2011), and second, the diminished social motivation hypothesis (Chevallier et al., 2012a). The theory of mind hypothesis of autism (Baron-Cohen et al., 1985) claims that autistic individuals' social-cognitive difficulties are caused by a lack of ToM. If autistic children have difficulty in representing other minds, it has been argued that they would be unable to represent how they are viewed in the eyes of others, and thus be incapable of reputation management (Izuma et al., 2011). However, children with autism do not categorically fail ToM tests – many pass first and second order ToM tasks, although this may be dependent on verbal ability and age (Scheeren, de Rosnay, Koot, & Begeer, 2013) and different processing of the task (Begeer et al.,

2010; Lind & Bowler, 2009). Therefore, individual differences in ToM ability may contribute to the propensity of reputation management in autism.

An alternative explanation for reduced reputation management is that autistic individuals are not socially motivated, as a consequence of diminished motivation for social stimuli in infancy, which in turn leads to a failure to develop appropriate social cognitive skills – including being able to manage reputation (Chevallier et al,. 2012a, 2012b). However, the diminished social motivation hypothesis of autism is not fully supported by research investigating autistic individuals' friendships, which demonstrates that autistic individuals do display social desire. For example, many children with autism explicitly report a need for friendships (Bauminger et al., 2003; Calder et al., 2013; Locke et al., 2010) and a desire to fit in with other people (Carrington, Papinczak & Templeton, 2003a; Carrington et al., 2003b; Daniel & Billingsley, 2010; Portway & Johnson, 2003). However, some children with autism also prefer their own company (Calder et al., 2013). It may be the case, rather, that variation in the desire for friendships (and therefore social motivation) could contribute to whether or not autistic children manage their reputation.

In addition to these two established theories, two novel accounts of the reduced reputation management seen autism were tested in the current study. The first relates to autistic children's expectations of reciprocity. Reciprocity is a behavioural response contingent on another's actions (Falk & Fischbacher, 2006). Typical individuals highly value reciprocity (Kahneman, 2003), with those who are more reciprocal likely to be seen as more cooperative and thus have a better reputation (Hoffman et al., 1998; Millinski et al., 2002; Molleman et al., 2013; Nowak & Sigmund, 2005). Therefore, understanding the principles of reciprocity and having expectations that others will reciprocate with you could underlie whether or not

reputation is managed. A lack of social reciprocity is a definitive behaviour in autism, with autistic individuals demonstrating a reduced number of appropriate social responses such as conversational turn-taking (APA, 2013). Economic games, which enable us to experimentally test how children respond to others' behaviour (Gummerum et al., 2008), can be used to test for social decision-making in children with autism. For example, in the prisoners' dilemma game, where children can make decisions about cooperating or competing, Sally and Hill (2006; see also Downs and Smith, 2004) found that autistic children were just as cooperative as typical children. This finding suggests that autistic children behave in a similar way in economic games to typical children. However, to the best of my knowledge, autistic children's understanding and expectations of reciprocity have not specifically been tested. In Chapter Four, it was suggested that expectations of reciprocity are likely based on experiences of reciprocity (Hoffman et al., 1994, 1996, 2008). In terms of social experiences, typical children often do not tend to reciprocate autistic children's friendships (Rotheram-Fuller, Kasari, Chamberlain, & Locke, 2010) and may frequently neglect and ignore autistic children in the playground (Kasari, Locke, Gulsrud, & Rotheram-Fuller, 2011). This research may lend itself to a reduced expectation of reciprocity in autistic children, which was previously noted in autistic adults (Chapter Two).

The second unexamined factor that may contribute to the variability in reputation management in autism concerns inhibitory control. To effectively manage reputation one needs to suppress behaviours that are detrimental to a good reputation but may be beneficial in the short term. There is currently mixed evidence as to whether children with autism have difficulties with inhibition (Christ et al., 2007). For example, Corbett et al. (2009) found poorer performance by children with autism on

a colour-word interference task, while others have found comparable performance on this task (Hill, 2004b). Variability in inhibitory control could therefore contribute to reputation management in autism.

6.1.1. The current study

Chapter Five showed that autistic children did not implicitly manage their reputation, but some could explicitly do so. Chapter Four indicated that ToM and social motivation contributed to the typical development of explicit reputation management, although no mechanisms could explain implicit reputation management. The current study measured the same four proposed mechanisms of reputation management – ToM, social motivation, expectations of reciprocity, and inhibitory control – in children with autism and a group of typical children matched for chronological age and verbal mental age. This study aimed to identify between-group differences on these measures, and whether these measures related to implicit and explicit reputation management using correlation analyses.

6.2. Method

This study used the same battery of tasks detailed in Chapter Four, designed to measure the four putative mechanisms underpinning reputation management. These measures were also related to tests of explicit and implicit reputation management, as detailed in Chapters Three and Five. The same participants as reported in Chapter Five took part in this study: 33 children with autism and 33 typical children (see section 5.2.1) and they completed the same procedure as detailed in section 4.2.3. Specifically, ToM was measured using the Strange Stories task (Happé, 1994; White et al., 2009a), and social motivation was measured using the Friendship Motivation Questionnaire (Richards & Schneider, 2005) and by offering children a choice

between playing a game on their own or with another child. Reciprocity, including expectations of reciprocity, was measured using the dictator game and manipulating the conditions in which children could reciprocate. Inhibitory control was measured using the go/no-go task in which children have to inhibit a prepotent response (Cragg & Nation, 2008).

6.3. Results

First, data from the current study were analysed to identify differences between the performance of typical and autistic children on the tasks designed to measure the proposed mechanisms of reputation management. Second, I tested for relationships between scores on the measures of ToM, social motivation, expectations of reciprocity, and inhibitory control, and between these scores and developmental variables (age and verbal ability). Finally, I considered how these scores relate to both implicit and explicit reputation management in autism using correlation analyses.

6.3.1. Between-participants analyses

Table 20 below shows the scores for ToM, social motivation, expectations of reciprocity, and inhibitory control tasks, for both autistic and typical children. Analysis of Covariance (ANCOVA) controlling for gender and verbal mental age is reported where significant changes to results occur.

Table 20.

Mean (standard deviation) results for the theory of mind, social motivation, understanding and expectations of reciprocity, and inhibitory control tasks for autistic (n = 33) and typical children (n = 33), including chronological and verbal mental age.

Measure		Autism	Typical
Chronological age	*M* (*SD*)	10.96 (2.11)	10.24 (2.00)
	Range	7.18 – 14.32	6.92 – 14.21
Verbal mental age	*M* (*SD*)	10.31 (2.35)	10.52 (2.28)
	Range	6.16 – 15.31	5.74 – 14.50
Theory of Mind			
Mental state Strange	*M* (*SD*)	6.79 (3.19)	8.58 (1.94)
Stories	Range	0 – 11	2 – 12
Nature Strange	*M* (*SD*)	6.88 (3.04)	8.12 (2.43)
Stories	Range	1 – 11	2 – 12
Social motivation			
Points spent to play with someone	*M* (*SD*)	5.67 (3.15)	4.85 (1.76)
	Range	0 – 10	0 – 8
Points spent to play	*M* (*SD*)	3.00 (2.80)	3.46 (2.99)
alone	Range	0 – 7	0 – 10
Friendship	*M* (*SD*)	37.03 (5.38)	35.82 (4.81)
Motivation score	Range	21 – 44	23 – 44
Direct reciprocity			
First move	*M* (*SD*)	4.85 (2.38)	4.13 (1.61)
	Range	0 – 9.40	0 – 6.20
Second move	*M* (*SD*)	4.79 (2.13)	4.11 (1.50)
	Range	0 – 8.80	0 – 6.80
Inhibitory control			
Hit rate	*M* (*SD*)	92.3% (8.24%)	93.9% (6.59%)
	Range	61 – 100%	80 – 100%
False alarm rate	*M* (*SD*)	39.6% (21.1%)	34.9% (19.6%)
	Range	4 – 92%	8 – 85%
d’	*M* (*SD*)	1.89 (.95)	2.03 (.89)
	Range	.08 – 3.87	-.27 – 3.73

Theory of mind. A 2 (group: typical or autism) x 2 (story type: mental state and nature) mixed ANOVA was conducted on Strange Stories task scores. This analysis

revealed a significant main effect of group, $F(1, 64) = 6.71$, $p=.012$, $\eta_p^2 = .095$. Children with autism performed worse than typical children on both mental state and nature stories. All other main effects and interactions were not significant (ps>.41). An ANCOVA controlling for verbal mental age and gender did not change these results, although there was a significant main effect of verbal mental age, $F(1, 62) = 32.52$, $p<.001$, $\eta_p^2 = .34$, suggesting that verbal ability significantly contributed to the variability in performance on the Strange Stories task.

Social motivation. Social motivation was first measured by asking children whether they would like to play a game with someone or alone. Table 21 below shows that the majority of children in each group preferred to play with someone, with few differences between the proportion of typical and autistic children choosing to do so. Chi-square analysis confirmed that there were no group differences on this measure, $\chi^2(1) = .80$, $p=.80$, $\varphi = .11$.

Table 21.

Number of children from each group who indicated whether they wanted to play a game with someone or alone.

	Group	
	Typical	Autism
Play with someone	20	21
Play alone	13	12

Children were also asked to spend between 0 and 10 points in order to play with someone or play alone (Table 20). A 2 (group: typical or autism) x 2 (play decision: with someone or alone) between-participants ANOVA on the number of points children paid to play alone or with someone showed a significant main effect of play

decision, $F(1, 62) = 8.78$, $p=.004$, $\eta_p^2 = .12$. Children across both groups spent more to play with someone. There was no other significant main effects or interactions (all *p*s>.80).

The Friendship Motivation Questionnaire (Richard & Schneider, 2005) was also used as a measure of social motivation (see Table 20). There was no significant difference between autistic and typical children on this measure, $t(64) = .96$, $p=.34$, $r=.12$.

Reciprocity. Direct reciprocity – how children directly respond to others' behaviour – was indexed by examining both the offers children made to others before the other player took their move (first move), and how children responded to an offer (second move). On average, the other player had always given the child 5 points, which would be considered a fair offer. One sample t-tests were used to test whether typical and autistic children's offers (Table 20) differed significantly from 5 points (and therefore deviating from a fair offer) during the second move. Typical children gave significantly less than 5 points, $t(31) = 3.38$, $p = .002$, $r=.52$, while children with autism did not differ from a fair offer, $t(32) = .573$, $p = .57$, $r=.10$. A 2 (group: typical or autism) x 2 (move: first and second) mixed ANOVA was conducted on the number of points offered during the first or second move. There were no significant main effects or interactions (all *p*s >.13), suggesting the two groups behaved similarly on both the first and second moves.

I also considered how children responded to offers from the other player during the second move condition on a trial-by-trial basis, by calculating the number of trials (out of 5) in which the child responded by giving fewer points than they had been given (punished), matching the same amount they had been given (reciprocated) and giving more than the amount they had been given (rewarded; Figure 29).

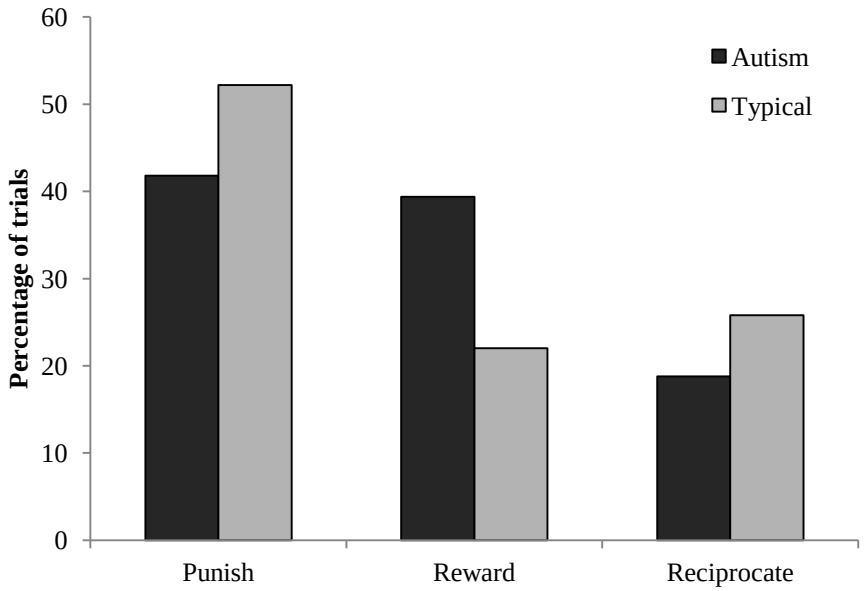


Figure 29. Percentage of trials where children in each group either punished, rewarded or reciprocated during the second move.

Chi-square was used to analyse the above data, and this analysis showed a significant association between group and response type, $\chi^2(2) = 11.57$, p=.003, φ =.42. As suggested by Figure 29, this association is driven by typical children tending to punish the other players offer, whereas autistic children either punished or rewarded the other.

Children's expectations of reciprocity were tested by giving children the opportunity to offer points to other players and to also guess how many points the other would give to them. These opportunities took place under two conditions – a baseline condition where the child was told that they were giving at the *same time* as the other player (thus there was no expectation of reciprocity, only predictions of others' generosity), and when they were giving *first* to the other player (expectations of reciprocity condition). In the latter condition, children were told that the other player would find out how many points the child had given them before making their decision. If children have an expectation that others will reciprocate their offer, then

they should guess that the other would match their offer in this condition. Figure 30 below displays the mean number of points offered and guessed in each of these conditions.

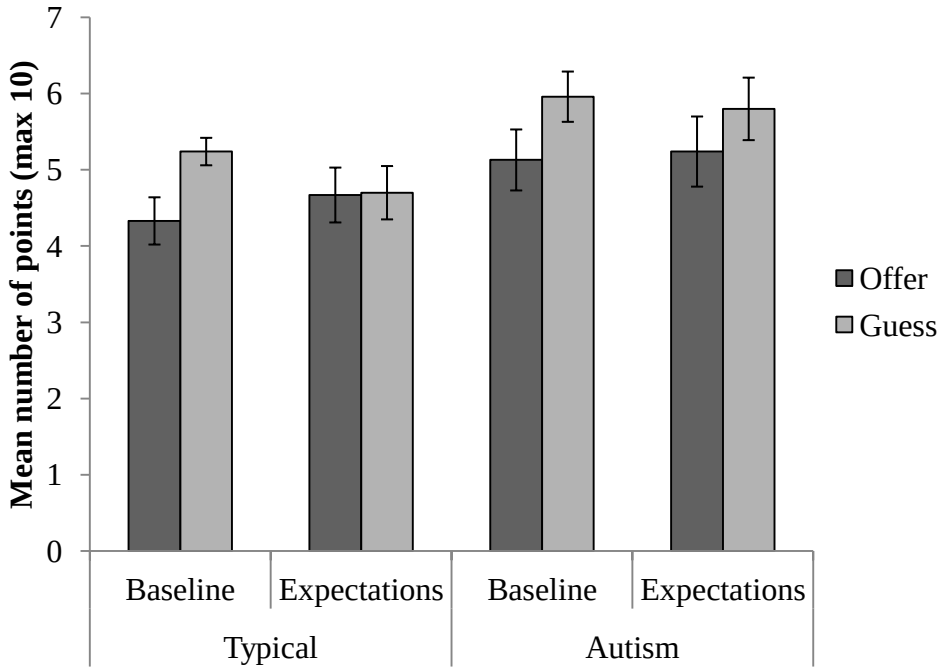
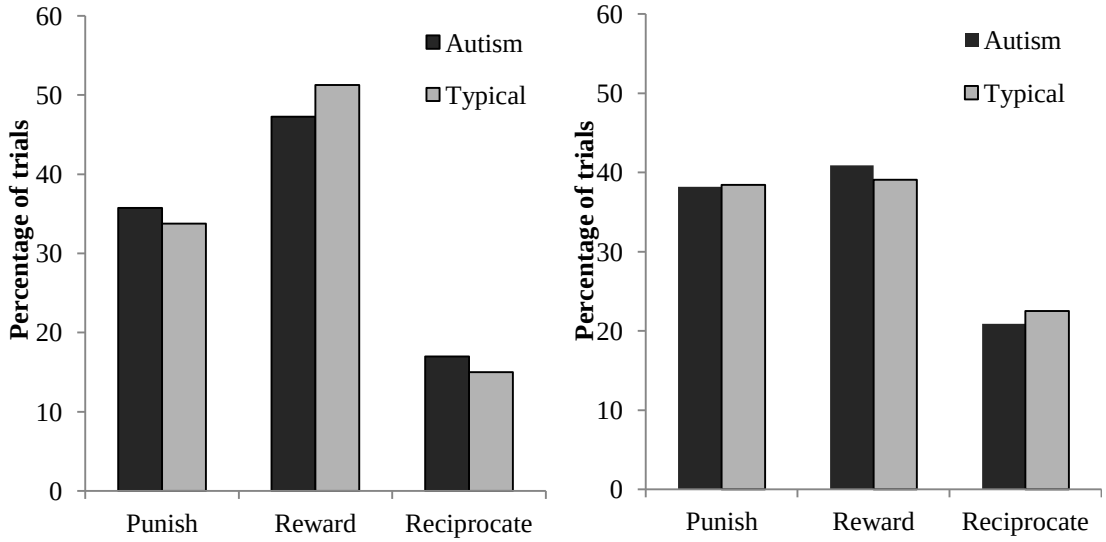


Figure 30. Mean number of points (maximum 10) offered and guessed by both groups according to whether the child was giving at the same time (baseline) or giving first (expectations of reciprocity). Error bars indicate +/- one standard error of the mean.

A 2 (group: typical or autism) x 2 (condition: baseline and expectations of reciprocity) x 2 (decision: offer and guess) mixed ANOVA on the number of points revealed a significant main effect of decision, $F(1, 63) = 6.46$, $p=.014$, $\eta_p^2 =.093$, such that the number of points children guessed the other player would give them was higher than the number of points they offered. There was a significant condition x decision interaction, $F(1, 63) = 5.25$, $p=.025$, $\eta_p^2 =.077$ but no other significant main effects or interactions (all ps>.06). To examine the interaction between

condition and decision, follow-up analyses using repeated-measures t-tests were run. These analyses revealed that there was no significant difference between offers at baseline and offers in the expectation of reciprocity condition, $t(64) = 1.21$, $p=.23$, $r=.15$, but there was a difference approaching significance between *guesses* at baseline and the expectation of reciprocity condition, $t(64) = 1.95$, $p=.055$, $r=.24$, such that guesses were higher at baseline. This result suggests that all children specifically reduced their guesses when there was an expectation of reciprocity. ANCOVA controlling for verbal mental age (since verbal ability could affect understanding of the concept of reciprocity) revealed only a significant main effect of group, $F(1, 61) = 4.02$, $p=.05$, $\eta_p^2 = .06$, and verbal mental age, $F(1, 61) = 5.87$, $p=.018$, $\eta_p^2 = .09$, such that autistic children tended to both offer and guess more points than typical children, and that variability in these results could be explained by verbal ability.

Next, I tested to see whether there were any differences in behaviour from baseline and in the expectations of reciprocity condition in terms of responses by trial – that is, whether they expected the other to give them fewer points (punish), more points (reward) or match (reciprocate) the points that they gave to the other player (Figure 31).



A. Baseline B. Expectations of reciprocity

Figure 31. Percentage of trials at baseline (when giving at the same time; A) and in the expectations of reciprocity condition (when giving first to the other; B) where autistic and typical children predicted either punishment, reward or reciprocation.

A three-way hierarchical loglinear analysis was conducted to assess the association between group (typical or autism), condition (baseline or expectations of reciprocity), and response type (punish, reward or reciprocate). This analysis produced a best-fit model, $\chi^2(7) = 87.03$, $p<.001$, which included a significant main effect of response type, $\chi^2(2) = 71.46$, $p<.001$, and a significant interaction between response and condition, $\chi^2(2) = 87.50$, $p<.001$. All other interactions and main effects were not significant (all ps>.55). Figure 32 below shows the interaction between condition and response type. This figure suggests that, across both groups, the interaction is driven by an increase in reciprocation and a reduction in expected reward in the condition designed to measure expectations of reciprocity.

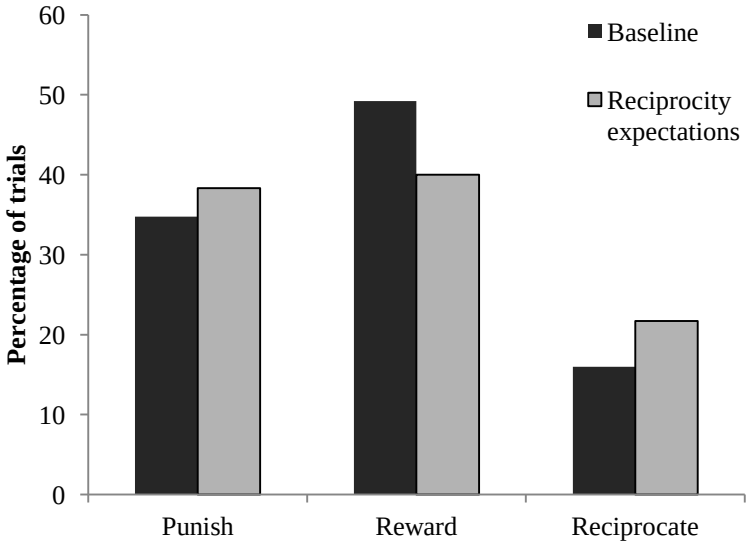


Figure 32. Percentage of trials where children punished, rewarded or reciprocated when giving at the same time and when giving first, ignoring the effects of group.

Inhibitory control. A MANOVA on the hit and false alarm rates (see Table 20) showed that there were no significant differences between groups in hit rate, $F(1, 64) = .10$, $p=.75$, $\eta_p^2=.002$, or false alarm rate, $F(1, 64) = .86$, $p=.34$, $\eta_p^2 =.013$. Hit and false alarm rates were utilised to calculate d'. There were no significant difference between groups on d' scores, $t(64) = .63$, $p=.53$, $r=.08$.

6.3.2. Relationships between mechanisms and reputation management

This section tested whether there were any relationships between performance on each of the tasks, between task performance and chronological or verbal mental age, and whether task performance related to reputation management in autism. Table 22 below shows the correlations and partial correlations (after controlling for verbal mental age) between all of the tasks for autistic children. Given the number of correlations conducted, a more conservative *p* value of .01 rather than .05 was used to identify significant correlations.

Table 22.

Raw correlations (partial correlations after controlling for verbal mental age in parentheses) between all of the variables designed to tap different mechanisms, reputation management, and chronological age and verbal mental age, for autistic children (n = 33).

	Chronological age	Verbal mental age	Implicit RM	Explicit RM	Theory of Mind	Friendship motivation	Social reward choice	Inhibitory control	Direct reciprocity
Verbal mental age	.76**								
Implicit reputation management	.24	.27							
Explicit reputation management	.19	.28	-.13 (-.22)						
Theory of Mind	.20	.64**	.014 (-.21)	.27 (.12)					
Friendship motivation	.067	-.20	-.13 (-.078)	-.25 (-.20)	-.40 (-.35)				
Social reward choice	.045	.16	.10 (.061)	.34 (.32)	.11 (.008)	-.004 (.030)			
Inhibitory control	.41	.18	.075 (.029)	.12 (.08)	.015 (-.13)	.071 (.11)	.17 (.14)		
Direct reciprocity	-.056	-.044	-.005 (.007)	.09 (.10)	.068 (.13)	-.058 (-.069)	-.075 (-.069)	.029 (.038)	
Reciprocity expectations	-.35	-.36	-.14 (-.048)	-.26 (-.17)	-.32 (-.13)	.039 (-.039)	-.21 (-.16)	-.37 (-.33)	.43* (.44*)

Note: *p<.01, **p<.001

There were few inter-correlations between measures. There was, however, a significant correlation between direct reciprocity and expectations of reciprocity, which remained significant after controlling for the effects of verbal mental age. This correlation suggests that these measures were tapping an underlying principle of reciprocity, and that autistic children's reciprocal behaviour was related to their expectations of reciprocity. There were no significant correlations (raw or partial) between explicit or implicit reputation management and any of the tasks designed to measure the different mechanisms.

Correlation analyses further revealed that there were few significant correlations between experimental and developmental variables. The exceptions to this were that autistic children's chronological age correlated positively with verbal mental age, and verbal mental age also correlated positively with theory of mind scores, such that theory of mind performance improved with higher verbal mental age.

Given the lack of correlations between measures, further exploratory analyses were conducted. Since explicit reputation management had a binary response as a dependent variable, I tested whether there were any differences between children who had decided to say "yes" or "no" to saving their position when bottom of the leader board, within each group on all of the tasks designed to measure the possible mechanisms. Such an analysis could inform whether results could distinguish between those who chose to protect their reputation and those who did not. There were only significant differences within the reciprocity tasks for autistic children (Table 23). Children with autism who said "yes" to saving when bottom of the leader board rewarded on more trials during the second move, $t(29) = 2.01$, $p=.054$, $r=.35$, made higher offers when giving first, $t(29) = 3.17$, $p=.004$, $r=.51$, and made higher offers when giving at the same time, $t(29) = 2.18$, $p=.037$, $r=.38$.

Table 23.

Descriptive statistics for measures of reciprocity which significantly differ between autistic children who said "yes" or "no" to saving when they came bottom of the leader board.

Measure	Save when bottom of the leader board?	
	Yes	No
Second move – number of rewarded trials	2.59 (1.58)	1.50 (1.40)
Offer when giving at the same time	6.12 (1.99)*	4.66 (1.67)
Offer when giving first	6.65 (2.31)**	4.26 (1.78)

Note: *p<.05, **p<.01 for offers significantly different to 5 points

One-sample t-tests were utilised to test whether participants significantly differed from an offer of 5 points, which would be considered a fair offer. Results revealed that autistic children who had said "yes" to saving when bottom of the leader board (those thought to be less concerned about their reputation) made offers higher than a fair offer both when giving at the same time, $t(16) = 2.32$, p=.034, r=.50, and when giving first, $t(16) = 2.94$, p=.01, r=.59. There was no difference from a fair offer for autistic children who had said "no" to saving when bottom of the leader board. These results suggest that autistic children who were considered to have protected their reputation were fairer during the reciprocity tasks.

6.4. Discussion

This study examined the relationships between autistic children's reputation management and their performance on tasks designed to measure ToM, social motivation, expectations of reciprocity and inhibitory control. I discuss the results from each of the component tests in terms of (1) group differences, (2) their

interrelatedness and associations with chronological and verbal mental age, and (3) the degree to which they relate to reputation management.

6.4.1. Group differences in the proposed mechanisms

Interestingly, results showed there were no differences between typical and autistic children on tasks designed to measure social motivation or inhibition skills, but there were some group differences with regards to reciprocity and ToM.

First, the findings concerning social motivation contradict the diminished social motivation hypothesis (Chevallier et al., 2012a). Children with autism in the current study chose to play with someone rather than alone as much as typical children, and they also expressed a similar motivation for friendships on a questionnaire measure (Richard & Schneider, 2005). These results indicate that autistic children *can* be socially motivated, supporting other research that suggests that this is the case (Calder et al, 2013; Deckers et al., 2014; Ewing et al., 2013; Locke et al., 2010). Second, previous studies have found mixed and inconsistent results on inhibitory control in autism (Christ et al., 2007; Hill, 2004a, 2004b; Ozonoff & Strayer, 1997), and the current study found no difference in performance between autistic children and typical children in the go/no-go task, supporting the claim that autistic individuals do not have difficulties with response inhibition (Adams & Jarrold, 2012).

In the reciprocity tasks, similar to Sally and Hill (2006), children with autism behaved in a manner akin to typical children. However, the autistic children in our sample were *fairer* than typical children when responding to another player's move during direct reciprocity, and they also rewarded the other player on significantly more trials. It may be the case that the autistic children were abiding more to rules or

norms concerning fairness (Schmitz et al., 2014), while typical children instead deviated from reciprocity. Previous research has noted that while typical children are able to report understanding of norms, such as fairness, they do not behave according to these norms and instead tend to maximise their own benefits (Blake et al., in press; Sheskin et al., 2014; van den Bos et al., 2010). Autistic children's tendency to stick more to norms may reflect the rigid and repetitive thinking characteristic of autism (APA, 2013).

The tasks also attempted to tap children's expectations of reciprocity by asking children to guess other's offers under two different conditions: when they were giving at the same time as the other (baseline condition – when the other player would not know the offer the child was making and there was no reciprocal element), and when they were giving first to the other (such that the other player *would* know how many points they had been given before making their decision), where reciprocal principles come into play. Whether we expect others to reciprocate could be an important mediator for decisions related to reputation management, for example, when deciding to trust someone (Tanis & Postmes, 2005). Initial analyses suggested that there were no differences in expectations of reciprocity between autistic and typical children, with both groups tending to have high predictions of generosity at baseline (such that they guessed the other would give them more points than they themselves were prepared to give) and then adjusting this when the possibility of reciprocity was introduced, suggesting that they were aware that the other's response would be contingent on their own offer. However, after controlling for verbal ability, autistic children gave significantly more points overall, and verbal mental age accounted for a significant amount of variance in the number of points given, suggesting that verbal ability may impact on expectations of reciprocity. It

may be the case that those with better verbal ability are also better at understanding social norms (such as reciprocity) which are thought to have evolved precisely because of language (Smith, 2010), and thus expectations could be related to the knowledge and experience of these norms (Hoffman et al., 2008).

Notably, there was a significant group difference on the Strange Stories task (Happé, 1994; White et al., 2009a). However, this group difference was *not* specific to stories related to mental state understanding, as performance on nature stories was also comparatively poorer than typical children's performance. Performance on the Strange Stories task also correlated significantly with verbal ability, as expected (Happé, 1995; Scheeren et al., 2013). These results suggest that children's performance was more contingent on verbal ability and story comprehension rather than a specific difficulty with ToM. Regardless of these data, any difficulties in ToM in autism may be insufficient to explain the social difficulties found in autism (Bennett, Szatmari, Bryson, Duku, Vaccarella & Tuff, 2013; Pellicano, 2012). Indeed, in a recent review of interventions based on ToM there was little evidence that such interventions had an impact on real-life social skills (Fletcher-Watson, McConnell, Manola & McConachie, 2014).

6.4.2. Relationships between mechanisms and reputation management

The relatively wide age range (from 7 to 14) of participants allowed performance to be analysed as a function of chronological age and verbal ability (as assessed by verbal mental age), such that any developmental changes could be identified. However, only verbal mental age correlated positively with ToM, further suggesting that performance on this task is related to verbal ability.

After controlling for the potentially confounding effects of verbal mental age, relationships between performance on each of the tasks were tested. There was a significant positive correlation between direct reciprocity (i.e. directly responding to another's offer) and expectations of reciprocity (i.e., predicting how another will respond to your offer), suggesting that these tasks were assessing the same construct, and that experiences of reciprocity could link to expectations of reciprocity in autism, similar to typical children (Hoffman et al., 2008).

A number of mechanisms were identified which might determine the degree to which children with autism engage in reputation management. Scores on tasks designed to measure individual differences in the candidate mechanisms, however, were not related to individual differences in implicit reputation management, even after controlling for verbal mental age. Chapter Five showed that both typical and autistic children showed a remarkably low amount of implicit reputation management overall. Even within a larger sample of typical children, there was no evidence of implicit reputation management until 12 to 14 years of age, and the degree of reputation management was not predicted by any of the possible mechanisms (Chapters Three and Four). In terms of explicit reputation management, there were no correlations between explicit reputation management and any of the mechanisms for autistic children.

Further exploratory analyses, however, revealed potentially interesting differences between autistic children who had said "yes" to saving when bottom of the leader board and those who had said "no". Specifically, autistic children who said "no" made fairer offers and rewarded on fewer trials during the second move. It may be the case that those with a more sensitive appreciation of reciprocity are also more

sensitive to their reputation when it is explicitly at risk. Autistic children who chose to protect their reputation seem to prefer fairness, suggesting that these children, like their typical peers, may use fairness as a signal to others (Shaw, 2013). Fairness is an important motivator of behaviour, especially in economic games (Fehr & Gächter, 2000; Fehr & Schmidt, 1999) and the current findings support recent research which notes that autistic children have explicit awareness of social norms such as equality or fairness (Schmitz et al., 2014). Indeed, Scheeren et al. (2010) claim that autistic individuals may be less effective in self-presentation (a form of explicit reputation management) due to an increased likelihood of sticking to norms – and thus they avoid self-presentational techniques such as lying or boasting to boost their reputation. Thus, learning about norms and social rules may contribute to variability in explicit reputation management in autism. However, caution is advised in the interpretation of this result since these analyses were prompted by the lack of correlations between any of the tasks; however, they do highlight interesting hypotheses for future research.

Considering the results from Chapter Four with typical children, the current study showed that different mechanisms may contribute to explicit reputation management in autism. For typical children, ToM and social motivation were related to explicit reputation management, such that those with better ToM ability were more likely to protect their reputation, and those who were more socially motivated were less concerned about their reputation. Neither of these mechanisms impacted upon reputation management for autistic children in the current study – instead, reciprocity was the only mechanism which appeared to have some relationship with explicit reputation management. These findings suggest that how autistic children come to

manage their reputation is likely to be different to how typical children manage reputation.

6.4.3. Limitations and future directions

It may be the case that some of the proposed mechanisms *do* contribute to implicit reputation management, but that the right tasks were not used to measure them. Social motivation, for example, is particularly difficult to measure (Demurie, Roeyers, Baeyens & Sonuga-Barke, 2012). As noted in Chapter Four, previous attempts to measure social motivation have used relatively static stimuli (e.g. faces) that may not be ecologically valid in estimating motivation for real social interaction (Risko et al., 2012). Thus, the current study employed a simple binary response to test children's preferences for social interaction. This binary response does not provide a fine-grain measure. For this reason, children could also 'spend' points after making their choice, under the assumption that a greater spend reflects greater motivation. Within both groups, children who wanted to play with someone spent more points than those who wanted to play alone, which confirms the validity of this measure. Nonetheless, future research should aim to develop measures which can reliably measure a child's social motivation.

There were a number of theoretical reasons to assume that the suggested mechanisms could play a role in reputation management (Chapter One). Perhaps, then, the tasks used were not sufficiently sensitive to detect potential differences between children with and without autism. The Strange Stories task (Happé, 1994) is frequently used to measure second-order ToM (e.g. White et al., 2009a), yet could only detect differences in language ability, as discussed above. Previous research utilising economic games to test social decision-making in autistic children have also shown

little difference between typical and autistic children (Downs & Smith, 2010; Sally & Hill, 2008), although some recent research suggests that children with autism may have different norm preferences (Schmitz et al., 2014). Finally, the go/no-go task has previously found mixed results (Adams & Jarrold, 2012; Christ et al., 2007; Hill, 2004a). Therefore, one would expect to find variability in performance on these tasks that could, theoretically, have contributed to reputation management. The fact that ToM and social motivation contributed to explicit reputation management in typical children (Chapter Four), suggests that these tasks are sensitive and developmentally appropriate, at least in typical development. The current study suggests that autistic children come to manage their reputation explicitly through alternative means. Rather than generating hypotheses based on preconceived notions of typicality, Chapter Seven will attempt to generate hypotheses from the "bottom up" by utilising qualitative methods to examine reputation management in autistic adolescents.

Overall, the current findings highlight that the ability to manage reputation explicitly may be underpinned by different mechanisms in typical and in autistic children. It remains unclear, however, why neither group of children appeared to implicitly manage their reputation. Future research, perhaps with older adolescents, is clearly needed to examine this issue further. In terms of explicit reputation management, autistic children who protected their reputation were also fairer. However, since this finding was obtained through exploratory analyses, further research is required to strengthen our understanding of reputation management in autism, and to examine alternative hypotheses. One method to further examine this issue is to adopt qualitative methods, by asking autistic adolescents to discuss issues surrounding reputation management.

Chapter Seven

‘I am who I am’: Reputational concerns in adolescents with autism

7.1. Introduction

Adolescence marks a number of social changes that may lead to increased concern for reputation. For example, during adolescence, intimate peer relationships tend to become increasingly important and valuable for typical individuals (Jankowski et al., 2014) and there is an enhanced desire to avoid social exclusion (Blakemore & Mills, 2014). Therefore, concern for what others – especially peers – think of oneself is of particular import during adolescence (Sebastian et al., 2008). Indeed, the reward systems of typical adolescents' brains have been found to be especially sensitive to the presence of peers in fMRI studies (Albert, Chein & Steinberg, 2013; Chein, Albert, O'Brien, Uckert & Steinberg, 2011). A change in behaviour when peers are present often occurs, such as increased risk-taking for immediate rewards (Chein et al., 2011; Gardner & Steinberg, 2005). Accordingly, behaviour in adolescence may be driven by a need to manage reputation in front of peers.

Adolescence, which appears to be a particularly "social" time, is likely to pose particular problems for individuals with autism, as autistic adolescents may struggle with the increased social complexities and demands of daily life (Carrington et al., 2003a) that the high school environment in particular presents (Adreon & Stella, 2001). Indeed, cognitively-able autistic adolescents have reported an increasing awareness that they are different to other people and report more concerns about their friendships than during the period prior to adolescence (Carrington et al., 2003b; Stoddart, 1999). They also report that they would like to fit in and have friends (Daniel & Billingsley, 2010), although they often feel like they simply do not fit in (Portway & Johnson, 2003), and lack the skills to successfully obtain desired friendships (Locke et al., 2010; Bauminger et al., 2003).

Young people with autism therefore have qualitatively different social experiences compared to their typical counterparts. As Damian Milton (2013), an autistic scholar, notes, although the social experiences of autistic individuals are *different* to that of typical individuals, there is not necessarily a lack of social experiences. For example, Carrington et al. (2003b) found that adolescents with autism reported using "masquerading" – pretending to know how social situations work – in order to hide their social difficulties from their typical peers. Carrington et al. (2003b) also noted that the autistic adolescents in their sample reported that encounters with peers could be frequently hostile. Williamson, Craig and Slinger (2008) found that compared to typical adolescents, adolescents with Asperger's perceived that they received less approval from their peers. Thus, despite friendship research (e.g. Daniel & Billingsley, 2010) suggesting autistic adolescents do desire friendships, how they experience these friendships (particularly those from typical peers) appears to be different, and perhaps more negative, than those experienced by typical adolescents.

For typical adolescents, being able to appreciate peers' perspectives may be one of the key skills for maintaining friendships (Blakemore & Mills, 2014). Autistic individuals are known to struggle with automatically figuring out others' perspectives (Ruffman, Garnham & Rideout, 2001; Senju et al., 2009), but they may learn to master some perspective-taking skills (Bowler, 1992; Happé, 1995; Scheeren et al., 2013) and are also capable of self-promotion (Begeer et al., 2008; Scheeren et al., 2010) – an ability that suggests that autistic individuals may be at least somewhat concerned by how they are viewed by others. Furthermore, autistic adolescents are sensitive to social rejection: following ostracism in a cyber ball game, autistic adolescents were negatively affected in terms of anxiety, self-esteem and belonging, much like their typical peers (Sebastian, Blakemore, & Charman, 2009).

7.1.1. The current study.

Chapter Two suggested that autistic adults are capable of managing their reputation, although their propensity for reputation management was reduced by lowered expectations of reciprocity. Furthermore, Chapter Five presented experimental evidence that some autistic children – like their typical counterparts – can be concerned about what other people think of them when it is explicitly clear that they may be judged by others. Despite these findings, autistic individuals continue to have difficulties with everyday social experiences, and there remains to be variation in the ability to manage reputation in autism. The main aim of the current study was to examine potential sources of this variability, given that previous chapters suggested that the proposed mechanisms could not sufficiently explain this variability. Exploratory qualitative methods were used to gain insight into autistic adolescents' social experiences, which could highlight previously unconsidered mechanisms contributing to reputation management in autism that other "top down" methods are too constrained to reveal.

I addressed this aim by examining autistic adolescents' friendships, their worries, their self-concept, and their perceptions of being "cool". Given the suggested importance of friends during adolescence (Jankowski et al., 2014), reputation specifically amongst friends may be of great importance, and the current study examined whether this suggestion is also true for adolescents with autism. Discussion of worries could also highlight concerns for reputation if autistic adolescents were to express concern over what others think. Examining autistic adolescents' self concepts, by asking them to describe themselves and to consider how others would describe them, tested their awareness that others can view them differently to how they view the self. The concept of being "cool" was examined

since young people can relate to this concept, and a reputation for being "cool" could be particularly pertinent in adolescence. For example, adolescents like to be seen as "cool" (Danesi, 1994), and "coolness" is used for proving masculinity in adolescent boys (Martino, 2000). Qualitatively examining whether autistic adolescents are concerned about having a reputation for being "cool" could elucidate potential explanations for variability in reputation management in autism.

Eliciting the social experiences of autistic adolescents by utilising qualitative methods is important in enhancing our understanding of their experiences (Carrington & Graham, 2001; Humphrey & Parkinson, 2006), which ultimately has implications for how autism is understood and perceived (Humphrey & Lewis, 2008; Molloy & Vasil, 2002). Semi-structured interviews are a key method to achieve this study's aim, by delving deeper into autistic adolescents' social experiences in order to develop further hypotheses concerning the underpinnings of reputation management. To the best of my knowledge, previous research examining autistic adolescent's social experiences have not done so in this context. Qualitative methods are therefore imperative in deepening our understanding of reputation management in autism, from the perspective of autistic individuals themselves (Bölte, 2014).

To this end, the current study involved semi-structured interviews with autistic adolescents to examine their potential concern for reputation. School staff supporting these adolescents were also interviewed to triangulate viewpoints and provide perspectives from individuals who witness the students' social lives within school. School staff are uniquely positioned by being able to report experiences of multiple students' social lives within the school environment, and are able to support and add to students' self-reports.

7.2. Method

7.2.1. Participants

Twelve autistic adolescents took part in this study (one female), aged between 12 and 15 years. Two participants were non-identical twin brothers (ID105 and ID106). The mean age of the autistic adolescents was 13 years 9 months (range: 12 years 9 months to 15 years 9 months). The adolescents were consider to be cognitively-able, with intellectual ability measured using the WASI-II (Wechsler, 2011; full scale IQ *M* = 92.25 (*SD* = 20.29), verbal IQ *M* = 91.42 (*SD* = 20.17) and performance IQ *M* = 94.08 (*SD* = 17.69)). Verbal IQ was used to calculate verbal mental age. Parents were asked to complete the Social Communication Questionnaire (SCQ; Rutter et al., 2003) to confirm that the students met the cut-off (a score above 15) for autism, which all students did. All students also had an independent clinical diagnosis of autism and a statement of Special Educational Needs. Individual characteristics of each autistic adolescent, including gender, chronological age, verbal mental age, SCQ scores, diagnoses (as reported by parents) and ethnicity, can be seen below in Table 24.

Table 24.

Individual characteristics of each participant, including gender, chronological age, verbal mental age, and Social Communication Questionnaire (SCQ) scores, diagnosis, age of autism diagnosis, and ethnic group.

ID	Gender	Chronological age (years: months)	Verbal mental age	SCQ	Diagnosis	Age of autism diagnosis (months)	Ethnic group
101	Female	12: 9	8: 3	33	Autism Spectrum Disorder	40	White – British
102	Male	13: 4	15: 9	32	Asperger's	118	White – other
103	Male	14: 11	13: 0	20	Autism Spectrum Disorder	48	White & Black African
104	Male	12: 10	9: 10	27	Autism	59	British Asian & East African
105	Male	13: 10	15: 10	25	Autism, ADHD	58	White – British
106	Male	13: 10	13: 0	21	Autism Spectrum Disorder, Dyspraxia	43	White – British
107	Male	13: 2	10: 2	32	Autism	60	White – British
108	Male	15: 9	14: 10	31	Autism, ADHD	84	White – British
109	Male	15: 0	10: 0	25	Autism Spectrum Disorder	36	White/Asian
110	Male	12: 11	12: 11	29	Autism, Dyspraxia	84	White – British/Asian
111	Male	12: 11	9: 7	28	Autism Spectrum Disorder	24	White – British
112	Male	13: 9	16: 10	28	Asperger's, ADHD, depression, anxiety disorder	87	White – British

The autistic adolescents were recruited through autism provisions attached to mainstream secondary schools in the London area and participation in previous research. Parental consent was obtained as well as written consent from each student before the interview commenced. Five members of school staff (Learning Support Assistants (LSA); one male, four female) from the same school who worked directly with of some of the interviewed autistic adolescents were also interviewed. These LSAs were all employed as part of an autism provision attached to a mainstream school in North London. They thus spend their time supporting students with autism, both one-to-one and as a year group (Table 25). All LSAs gave written informed consent to participate.

Table 25.

Individual characteristics of the school staff interviewed, including a description of their work with autistic students.

ID	Gender	Description of work
T101	Male	Has main responsibility for the group of year 8 students*, supports less in lessons but students frequently come to his office for support.
T102	Female	Works with "nurture group"ϕ, has worked one-to-one with other students who spend more time in the mainstream school.
T103	Female	Works with year 10 students, one afternoon a week with year 8 students, and one-to-one with a year 7 student.
T104	Female	Works with year 9 students, six students of whom are in the "nurture group", and three students who spend more time in mainstream school.
T105	Female	Works with a variety of students in years 7, 8 and 10, has main responsibility for the group of year 7 students.

Notes. *English secondary school years with the following age groups: Year 7 = 11-year-olds, year 8 = 12-year-olds, year 9 = 13-year-olds, year 10 = 14-15 year-olds. ϕ The "nurture group" consists of students with more severe autism who spend most of their time receiving specialist education in the autism provision.

Ethical approval was obtained from the Faculty of Policy and Society's Research Ethics Committee at the Institute of Education, London.

7.2.2. Procedure

Development and content of interview schedules. The semi-structured interviews for autistic adolescents were guided by the study's aim and developed in consultation with a senior LSA at one of the participating schools to ensure that the questions would be suitable for the autistic adolescents. These interviews included questions about friends (e.g., "*what does being a friend mean to you?*"), being "cool" (e.g. "*what makes someone cool at your school?*"), and worries (e.g. "*can you tell me about things that make you feel worried?*"). Autistic adolescents' self-concepts were examined in order to test whether they were explicitly aware that others could describe them in a different way to how they described themselves. To this end, adolescents were asked to describe themselves and to describe how they believed other people would describe them. The full interview schedule can be seen in Appendix A. Following the recommendations of Harrington, Foster, Rodger, and Ashburner (2013), the participating adolescents were given the opportunity to view the questions prior to the interview. They also had access to a visual schedule which detailed the four main topics of the questions (school, friends, worries and "you"), and could use sign cards to communicate to the researcher if they wanted the interview to stop, to take a break, or if they did not understand the questions. However, none of the autistic adolescents elected to use these cards during the interview.

The questions for LSAs focussed on everyday working life (e.g. "*how would you describe the students you work most with?*"), students' friendships (e.g. "*can you tell me about the friendships you witness?*"), students' worries (e.g. "*what kinds of things*

concern or worry the students you work with?"), and attitudes from mainstream non-autistic students toward the autistic students (e.g. "*how do you think the other students, without autism, in the mainstream school view the students with autism?*"). The full schedule can be seen in Appendix B.

General procedure. After parental consent was granted, consent was obtained from the autistic adolescents themselves. Prior to obtaining consent, the primary researcher spent a considerable amount of time building rapport with the autistic adolescents. Five participants had previously participated in other research with the researcher (Chapters Five and Six) but the other participants had not previously been involved. These students were thus visited at school every week over four weeks, the researcher spending time with them in lessons and during break time. Such rapport building was deemed necessary in order to prepare the student for the interview experience and reduce any anxiety that could have arisen from participating in an unfamiliar situation with an unfamiliar adult (Harrington et al., 2013). The week before the interviews were due to take place, the researcher described the interview process in detail, ensured that the student understood what the research would involve, and then obtained written informed consent from the student. Two additional autistic adolescents whose parents gave consent for them to take part in the study withdrew from the research at this point.

The interviews took place at school in a quiet place during school hours, and were recorded and later transcribed verbatim. The length of the interviews with the autistic adolescents ranged from 9 minutes to 26 minutes (mean = 15 minutes). After completing the interview, the students completed the WASI-II (Wechsler, 2011).

For the LSA interviews, these interviews were conducted at a time convenient to the LSA, and all interviews took place within school hours. The LSAs were aware that some of their students had also been interviewed. Interview length for LSAs ranged from 16 minutes to 25 minutes, with an average length of 20 minutes.

7.2.3. Data analysis

Interviews were recorded and transcribed verbatim and NVivo was used to collate and organise the data. Thematic analysis was used to examine and identify themes within the interviews. A deductive approach was used, with data analysed at the semantic level, that is, themes were directed by existing ideas, and the identified themes reflected the actual content of the data. A realist framework was also used whereby one assumed that reality was evident in the data (Braun & Clarke, 2006). The thematic analysis was guided by the recommendations of Braun and Clarke (2006), which dictates six steps for the analysis: data familiarisation, generation of codes, searching for themes, reviewing themes, defining and naming themes, and producing the report. The interviews were coded independently by two researchers and themes were agreed upon between the researchers.

7.3. Results

7.3.1. Interviews with autistic adolescents

The interviews involved questions surrounding four main topics: reputation concerns, friendships, worries, and self-concepts. In response to questions about these topics, several themes were identified, as described below. The overall themes and their sub-themes can be seen in Figure 33.

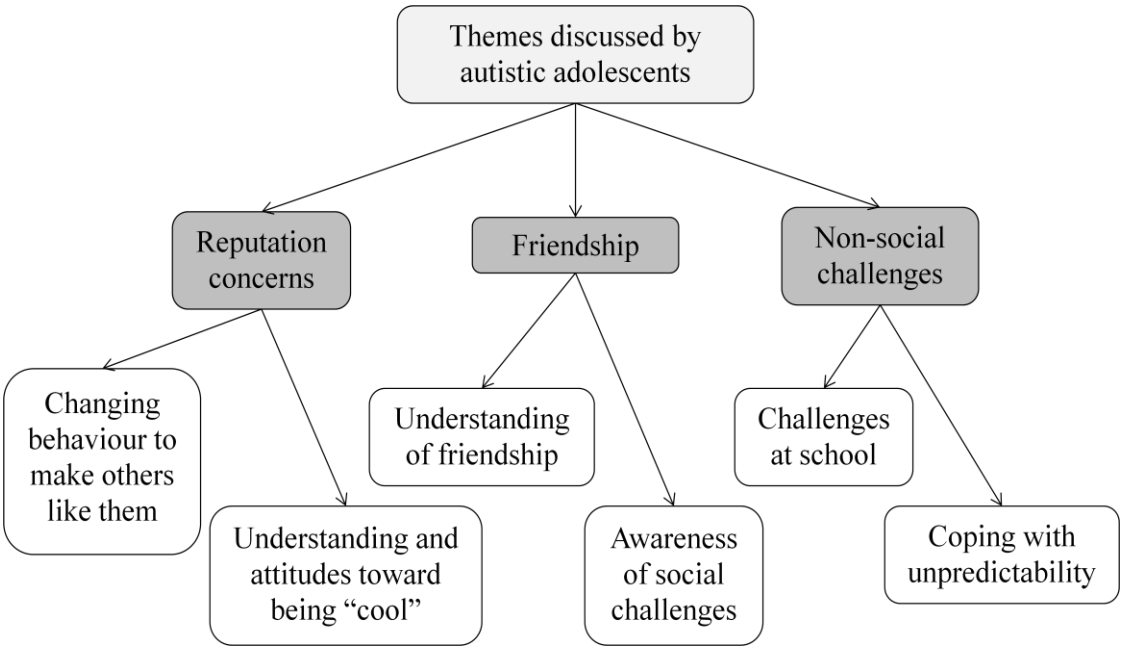


Figure 33. Themes and sub-themes discussed by autistic adolescents.

Reputation concerns. Considering the theme of reputation concerns, two sub-themes were identified when autistic adolescents discussed concerns about what others think: first, autistic adolescents discussed explicit reputation management, that is, whether they had changed their behaviour to make other people like them, and second, they discussed their understanding and attitudes toward the notion of being "cool".

Changing behaviour to make others like them (explicit reputation management). Five adolescents recalled a time where they had deliberately changed their behaviour to make others like them. For example, some adolescents reported that they had focussed on learning more about a particular topic in order to make others like them: *"Well I did try to look up more about games 'cause my friends were always making funny references to games, so I tried to look up and find references to make as well, [so I could] make everyone laugh"* (ID105). Another participant reported how he tried to control his temper in order to make sure others liked him; "*when [a new*

student] came in [I] tried to be very calm, friendly, slick, not too aggressive, 'cause I didn't want to scare him", and how he had misbehaved to impress others in the past: "*I just was kind of a bad boy back then y'know, I used to do not good stuff, stuff I wasn't proud of, like always used to try and act big to other students*" (ID103). Another participant noted that he did change his behaviour – "*well sometimes, sometimes I don't really want to*" (ID104) – but could not explain how he changed his behaviour or why he did not want to change.

Six of the autistic adolescents said that they had not changed their behaviour to make others like them. Two adolescents spontaneously expanded on this by describing how they were happy with how they were: "*I'm fine the way I am*" (ID107) and "*I don't change myself, like, you know, go like dude or anything like that. I just be who I am really*" (ID106).

Understanding and attitudes toward being "cool". When discussing the notion of being "cool", a theme was identified relating to autistic adolescents' understanding and their attitudes toward being "cool". Many autistic adolescents (n = 7) reported that they did not want to be "cool" – first, because many did not understand the point of being "cool" and were not impressed by the notion of "coolness":

> "*I don't really think much of it. When I say that I mean... not very impressed by it pretty much. I don't see the point.*" (ID102);
>
> "*They're just like all "look at me" and I'm just thinking what a bunch of idiots. You look at them, you just think "what's the point?", 'cause you're making yourself look good yeah, but it's not really helping you in any situations in life. There's no point really 'cause it might help you for a day or*

two but after that everyone's just like "oh he's just doing the same thing"" (ID108).

Further, other participants took pride in *not* being "cool" and instead preferred being different and not following the crowd:

"*If I was ever seen as a person who likes popular music and who likes to talk about sport I would be devastated, and I would do everything within my power to make myself seem uncool, no matter what that does, because I'm not one of those people who likes to be popular and modern.*

EC: Do you know why you're not interested in that?

Student: Well because I'm not like - people seem to follow people around all because it'll make them popular or because they like certain things. Well I think I am who I am, and think what you want, and do what you want, but you're not going to change me. And if you have a problem with that, that is your own problem" (ID112).

Accordingly, being true to one's self was one of the most common explanations for why autistic adolescents did not want to be seen as "cool":

"*I just feel uncomfortable with this, like this cool stuff going on anyway. I'm not interested at all. It's good to be who you are I say.*" (ID106);

"*I just feel like people should just be themselves, not act like somebody you're not. 'Cause my friend, the group, have been trying to act like they're twenty years old and I'm not buying that. I'm going if you're going to act like that, I want to tell them that "guys I like you for who you actually are, not 'cause*

you do all these stuff, not 'cause of how you look, just 'cause of who you are'"" (ID103);

"*Just 'cause [some people are] different doesn't mean they're not cool. Like what people see as trendy and hip whatnot, that's where the theory is at and that's fine, but if they don't like someone because they're different, well that to me isn't necessarily cool*" (ID112).

Another reason that autistic adolescents did not try to be "cool" was due to the fact that they did not understand the rules behind being "cool"; "*I don't even know the rules. I just didn't care, I just ignore it. I just don't concentrate about the rules. I just don't really care about being cool*"(ID106), "*I'm not sure how you would describe it but they just try and act in a way that you'd describe as cool and that way changes every day apparently*"(ID102).

Many autistic adolescents could identify that there were certain rules that surrounded the concept of being "cool". For example, several adolescents equated that being "cool" involved being stylish or fashionable: "*'cause I want to wear some fancy clothes and... wear everything, whatever they want*"(ID101), "*they've all got, like, cool hairstyles and stuff, and you know they're always trying to just, like, look like cool*"(ID110). Bad behaviour was also commonly discussed as a trait of "cool people", for example: "*I don't like them all, they're really, really, naughty. Some of them get external exclusions. Really it can get quite annoying sometimes*"(ID110).

Finally, some autistic adolescents noted positive benefits to being "cool", including being able to make friends, "*just so you can get more friends and stuff, even though I've got lots you know*"(ID107), "*I want to go out in the playground and play with them*"(ID109). Also, some adolescents felt that being "cool" was to be nice, "*well*

someone who's nice, who's willing to be friends with everyone, likes someone for who you are not because of how you look and your money"(ID103), or to have a special talent, *"[other student] is cool; he is a computer genius*"(ID111).

Friendship. All autistic adolescents stated that they had friends. The number of friends that the autistic adolescents had varied widely: five of the adolescents stated that they had lots of friends (e.g. "*I've got tonnes of friends*"(ID107)). Three adolescents distinguished between having close friends and those who were more casual acquaintances: "*I've got two proper, proper, proper friends and I've got other friends, but a bit, you know, just I'm really cool with them*"(ID106); "*I'm happy with [the friends I have] 'cause there's the friends what you're with a lot and there's some people you like sometimes chat to*"(ID108). One autistic adolescent stated that he preferred his own company: "*Most of the time I like to be myself, like if I'm with someone and I'm having fun and I'm talking to them that's good, but afterwards I tend to block it out*"(ID112).

Two sub-themes were identified following autistic adolescents' discussion of their friendships: their understanding of friendship and their awareness of their social challenges.

***Understanding of friendship*.** All of the autistic adolescents reported understanding of what friendship meant to them, although there were times when many of the adolescents struggled to define exactly what friendship meant: "*I don't know really how to explain a friend really properly*"(ID108), "*I understand that I have friends but it's quite hard to understand the concept of it*"(ID112). Friendship was mostly equated with companionship, such as spending time with friends (e.g. "*they always hang out with me*"(ID104)), sharing interests with friends (e.g. "*it's very easy to talk*

to each other because we like very similar things"(ID106)), and helping one another (e.g. "*it's good to have lots of people to talk to and to help you*"(ID110)). Half of the students also reported that having friends gave them some kind of emotional support, for example: "*you can rely on each other, you can cheer each other up, and there's just someone there to help you and be friends with you, someone who cares*"(ID105).

On the whole, the autistic adolescents appeared to be satisfied with their friendships, with several adolescents claiming that if they had too many friends, difficulties could arise;

> "*There's lots of people that I'm not particularly friends with, but I talk to. The thing is if I became proper friends [it's] just going to lead to lots of problems 'cause there's too many people. [...] Someone [will] be all this thing like "oh this guy said this, and this guy said that yeah" and then that apparently "that's really rude, that's really rude, you swore at me" or something like that, and that's not really what I want. It's not exactly what I'm interested in.*
> *EC: Why aren't you interested in that?*
> *Student: Well I don't know, it just confuses me*"(ID110).

***Awareness of social challenges*.** Ten autistic adolescents identified specific social challenges that they had faced. Some autistic adolescents explained how making friends could be difficult, particularly when starting at secondary school: "*Well it's actually tough to get your friends at first, so it's going to be tough to like to talk to them and stuff you know. Like when you start secondary school, it's going to be like really hard to make friends*" (ID107). Other autistic adolescents found having to interact with strangers particularly challenging: "*I like being with my friends and*

sometimes all by myself. I don't like working with new people" (ID105); "*I dodge working with strangers as much as possible, like other kids in classes*" (ID106).

Two autistic adolescents expressed that they particularly disliked it when they were observed by others, for example: "*when I'm playing cricket I hate it, I hate when I just go in and then you see there's two of you and there's eleven fielders and they're all staring at you, and then all the people on the side are staring at you. Sometimes I stand there and my legs start shaking*" (ID108). Two autistic adolescents also noted that they worried about others disliking them, such as: "*[I worry about] people liking me, and like my friends never invite me to places. They always use the excuse that I'm not allowed*" (ID103). Finally, one adolescent discussed how he had found the internet useful in being able to find others who went through similar social challenges to himself: "*[online there is] stuff that's relatable, because like a lot of things on there I can relate to, like struggling with things socially, [such as] having to act like you understand something when you don't*" (ID112).

Non-social challenges. Aside from social challenges, two themes relating to non-social challenges were identified, including challenges at school and coping with unpredictability.

Challenges at school. Eight autistic adolescents reported challenges related to school. For the most part, these challenges related to exams, tests, or homework: "*family make me worried, [there is] pressure on to do well in your exams*" (ID108); "*When I'm close to like a deadline for something, like having work to do, and I've kind of already started on it but I haven't had the time to do much on it - that kind of things worry me"* (ID112). One autistic adolescent reported finding coping with

noise in the classroom challenging: "*It's very distracting [when] the class is being a bit noisy. [I] really don't like that at all*" (ID101).

***Coping with unpredictability*.** Five autistic adolescents reported that they struggled when things in everyday life were unpredictable, such as when teachers or Learning Support Assistants changed: "*[I worry] about the LSAs get changed again*" (ID101); "*I don't like people leaving and then coming. It kind of confuses me - I just like [it] being all the same people, the same always*" (ID110). One autistic adolescent described in detail how he coped with unpredictability by ensuring all of his belongings were organised in a certain way: "*I like being in the same chair, with my diary, with my pencil case, neatly – ruler, pencil, pen, book, in front of me, any extra books on the side here like that, straight line, and then here my bag. I don't like it flopping around, I like it at the side nice and straight*" (ID105).

Self concept: Direct and reflected self-evaluation. Autistic adolescents were asked to describe themselves (direct self-evaluation) and to report how they thought other people would describe them (reflected self-evaluation). All autistic adolescents were able to describe themselves under both of these conditions. Table 26 below compares direct and reflected self-evaluations from each student, showing that ten students gave descriptions with considerable overlap between direct and reflected self-evaluation.

***Direct self-evaluation*.** Four types of direct self-evaluation were identified and categorised: physical, personality, behavioural and identity descriptions (Table 27). Eight autistic adolescents described themselves in terms of personality traits, such as being friendly, and six autistic adolescents described themselves by referring to physical traits, such as height or weight. Four autistic adolescents described

behaviours that they felt defined them, such as their ability to do work. Finally, four autistic adolescents reported some form of identity, for example, as just being themselves.

Reflected self-evaluations. As with direct self-evaluations, physical, personality, behavioural, and identity descriptions were identified when autistic adolescents were asked to consider how others would describe them (Table 26). Eight autistic adolescents referred to personality traits and four autistic adolescents referred to behavioural traits. Only two autistic adolescents said that others would describe them with reference to physical traits. Two autistic adolescents referred to identity. Finally, several adolescents reported that they did not know how someone else would describe them, for example:

> "*See I don't know, because when I'm asked that kind of question 'how would someone else describe them' I can never know, 'cause I've no idea what they're thinking. I can assume but...*
>
> *EC: What about someone who's really close to you, like a good friend or your parents, what might they say about you?*
>
> *Student: I think, well, the same thing. No matter how close they are, I wouldn't be able to know how they would describe me*" (ID112).

Table 26.

Direct ("how would you describe yourself") and reflected ("how would other people describe you") self-evaluations made by all of the autistic students.

ID	Direct self-evaluation	Category	Reflected self-evaluation	Category
101	"I say that I look more beautiful than you" "Not wearing nail varnish"	Physical	"They say I look more lovely than any other children" "I think my best friend would describe me... like... look very beautiful with this blazers and your school trousers"	Physical
102	"Average height, I think... not very strong" "Smart", "Cheeky"	Physical Personality	"I'll go for smart again" "Pretty much ... um in the geek group"	Personality Identity
103	"I'm slick, very nice, quick, fiery, loyal"	Personality	"Well people describe me as nice, but sometimes I can a be a little bit of a jerk-off" "Arrogant, only care about myself" "Very vain. I'm always concerned about my looks"	Personality
104	"Just a regular, regular kid"	Identity	"Popular maybe [...] you know, cool"	Personality
105	"I'm jolly and sometimes I'm a bit negative I have to admit... a bit nervous, shy" "Not very good at work" "A bit overweight"	Personality Behavioural Physical	"I honestly don't know" "Some people would say jolly or happy and caring and now then someone might say I'm a bit too negative" "He's fine, he's quite funny" "He's alright at gaming"	Personality Behavioural
106	"I'm funny" "I'm kind to my friends sometimes" "I'm just I just be who I am really" "I'm not very good describing myself too. I just don't really like describing myself, it's better to know someone in person think what does he look like"	Personality Behavioural Identity	"Usually my friends say I'm funny" "I'm trust and very good to be trusted. I don't lie often"	Personality Behavioural
107	"I'm getting big as well" "I'm friendly and sometimes funny" "I'm a teenager"	Physical Personality Identity	"You know friendly, maybe funny"	Personality

108	"I'd say I would have some rugby build I would say" "I'd like to say quite friendly to people" "I can joke around"	Physical Personality Behavioural	"Sometimes we always like annoy each other, so people would say I'm annoying" "Mum mostly she would say that you've got a big build for rugby, and I just I just go with it"	Behavioural Physical
109	"[Own name] is good" "I like having conversations"	Behavioural	"Good"	Behavioural
110	"Quite friendly and like a nice person, kind and like accommodating. I'm friendly and like good friend to have maybe" "I'm not sure about height because I'm not fully grown" "I don't really know"	Personality Physical	"I don't know it's confusing. I don't know how other people would describe me because I'm like- there are a few people who don't like me and they obviously wont describe me in the best way but like there's only few people who sort of like me. I don't even know they don't really know much about me so they're not really going to describe me anyway" "I mean [friend] might say I'm a nice person and stuff" " My old school friends they let people be themselves and stuff"	 Personality Identity
111	"I am... good, I'm never a bully"	Personality	"Like a very nice friend, good friend"	Personality
112	"When people ask me to like describe myself I tend to shudder 'cause I can't really think of anything specific. One thing I'd say would be I am who I am, and I do what I do, and I like what I like"	Identity	"See I don't know because when I'm asked that kind of question "how would someone else describe them" I can never know 'cause I've no idea what they're thinking I can assume [...] No matter how close they are I'm I wouldn't be able to know how they would describe me"	

7.3.2. Interviews with LSAs

Four main themes were discussed by LSAs, specifically a desire to fit in, friendships, non-social challenges, and the challenge of living with autism in a neurotypical[4] world. These themes and their sub-themes can be seen in Figure 34 below.

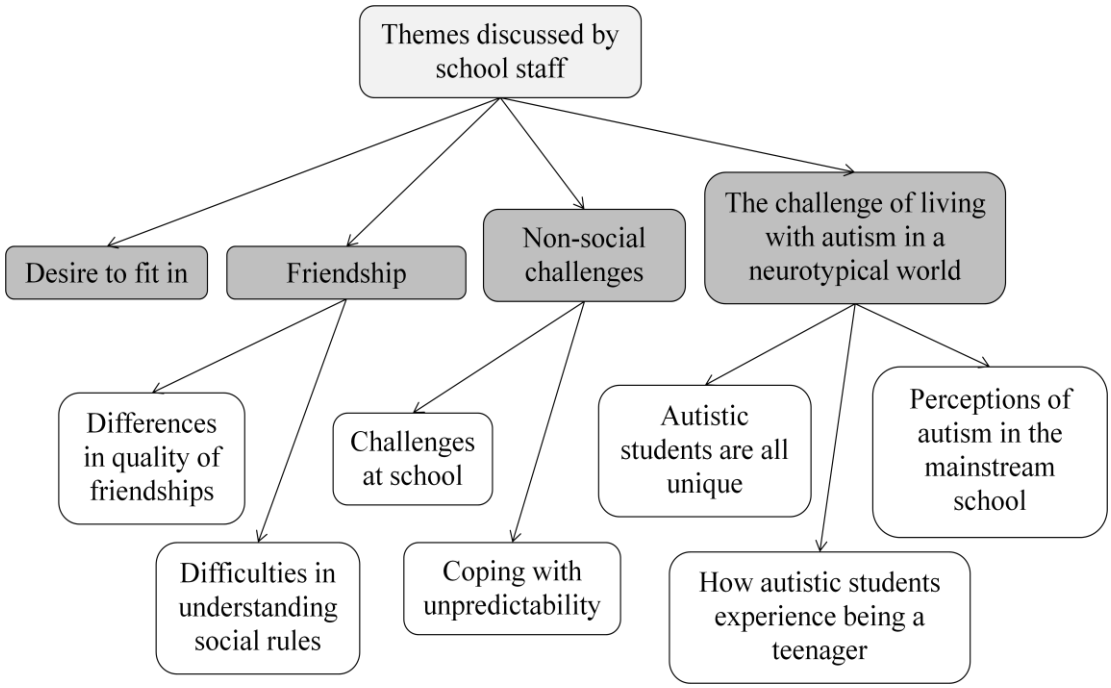


Figure 34. Themes and sub-themes discussed by Learning Support Assistants.

Reputation concerns: Students have the desire to fit in. All five LSAs reported that they believed that the autistic adolescents they worked with were concerned about their reputation at times. My analysis identified a theme relating to the *desire to fit in*. For example, LSAs noted that their students did not appear to want to be seen as autistic by other students:

> "*He still prefers to be in his main school form than come back here [to the autism provision] for form time. Which is fantastic and it's great, but he sees*

[4] Those considered to have developed typically are said to be "neurotypical".

it as more of a stigma coming back here. He wants to be seen as everyone else." (T101);

"*The one who has asked me before "why am I autistic", she gets very upset and very stressed, and she's like "you know to be one of the cool kids you have to wear this", and it's like "okay that's interesting where did you get that perception from?". And she will do anything to be like one of the cool kids, including covering her face in makeup, which - it might be dripping - but it's the logic of the "you have to put make up on in order to look like, in order to be like this"*"" (T102);

"*[A challenge for students is] how they're by perceived in the main school as well, do they look different, are they different, do they act differently. They try to blend in with everybody else, but there are times when you can see that that child just isn't blending as well as they could do, and that they do know when that happens - especially the girl, she really does know*" (T104).

Friendship. All of the LSAs could identify specific friendships between the autistic adolescents, both within the autism provision and with non-autistic students in the mainstream school. Two themes were identified in LSAs discussion of friendship: differences in friendship quality and difficulties in the understanding of social rules.

Differences in quality of friendships. LSAs discussed how they believed there to be a difference in quality in autistic adolescents' friendships compared to those of typical adolescents. For example:

"*They also have their friendships, so the two boys in our class who like London transport and buses, there is some form of friendship you can see there. It's not in the typical form of playing together but they have a shared*

interest. If you were to look at it in typical children you would see it as, for want of a better word, you might see it as them being in a relationship more than kind of a friendship, because it's the way they perceive friendship in autism is very by the book, but they try their best." (T102);

"*I don't know about deep meaningful friendships, where you go around to each other's house for tea, don't think it's on that level. So it's a case of, yeah, we'll sit with you at lunchtime, you can talk to us, we'll answer, but we might not go out of our way*" (T105).

Difficulties in understanding social rules. Four LSAs described how the autistic adolescents they worked with found friendships difficult due to struggles in understanding the complex rules of social life:

"*I think that some of them are very aware of the fact that they find socialising very baffling, and it has to be learnt, and quite nerve-wracking because socialising is very unpredictable. There's lots of facial expressions to read, there's social cues, there's jokes, there's games that they might not see the point in [and] not enjoy doing, not really understand the need to sometimes to go with the flow*" (T103);

"*They find it very hard to start off a conversation some of them, and when they're in a conversation they don't know sometimes the right way for the conversation to go, or how to answer the conversation. Occasionally they will start it but it fizzles out*" (T104).

The challenge of living with autism in a neurotypical world. A theme was identified amongst all LSAs relating to what they believed it was like to have autism in a neurotypical world. Within this theme, there were three sub-themes that

contributed to how the LSAs believed their students experienced the world, specifically, the fact that their autistic students were all unique, how autism was perceived in the mainstream school, and how autistic students experienced being a teenager. Together, these themes suggested that the LSAs believed that their autistic students experienced the world differently to those without autism.

Autistic students are all unique. When describing their students, all of the LSAs expressed that there was much variability amongst the students that they worked with, for example:

> "*You see, I think I think "normal" is sort of the key word. That it's not normal, because autism is - there no normal, what is normal? You could get fifty kids with the same diagnosis and they're all completely different. [...] What might be normal for one kid is the complete opposite for another kid*" (T103).

Perceptions of autism in the mainstream school. All of the LSAs also noted several challenges that their autistic students faced in a mainstream school setting, specifically with reference to how the non-autistic students perceived and understood the autistic students:

> "*I think they [the mainstream students] would say that, yes, they're different but they're quirky different. [...] I have picked up on a couple of students who've said "oh so-and-so's not normal" and I've said to them "actually, what is normal, you tell me what's normal", and when you ask a mainstream student that they're like "well I don't know"*"" (T104).

Despite being perceived as different, all of the LSAs did believe that the autistic adolescents they worked with were largely accepted by the non-autistic students, for

example: "*You have got the handful, and it's quite a large handful, of students that are very accepting and won't even think of them being here as any different. They think of them as a [school] student not a [provision] student*" (T101).

How autistic students experience being a teenager. Four LSAs reported that despite all of their students being unique individuals, the students they worked with were nevertheless teenagers – an experience that all young people go through, regardless of whether or not they have autism:

> "*They all demonstrate those insecurities in different ways, which is quite normal really. Oh there's that word again, "normal", but that's something that you know is regardless as to whether somebody's neurotypical or not neurotypical*" (T103);
>
> "*They worry about friends, they worry about socialising, they worry about exams, tests - just the normal things that a teenage child would worry about, whether they've got special needs or not, they all worry about the same things*" (T104).

Nonetheless, LSAs noted having autism could make the experience of being a teenager more challenging: "*[you are] generally wanting to fit in with your peers, but you have the added stress of being autistic*" (T102); "*You're not dealing with anything different, you're just dealing with children that have a slightly different outlook upon life, that just find things a little more chaotic and they just need to make sense of the world. And that's all you do, you just, you know, you're just helping them get through dealing with a very complex world*" (T105).

Non-social challenges: Coping with unpredictability in everyday life. Aside from social challenges, coping with unpredictability emerged as a key theme amongst

LSAs. For example, one LSA felt that the greatest challenge her students faced on a day-to-day basis was "*dealing with everyday life and the unpredictability of everyday life*" (T102). The LSAs described specific incidents of students struggling to cope with unpredictability:

> "*If someone's sitting in his seat he'll find it quite difficult, and he won't really want to stand out as saying it's an issue, but he'll want to sit in his seat and he won't really take a compromise of sitting somewhere near or elsewhere*" (T102);
>
> "*[They struggle with] transition, moving from one place to another, movement along the corridors, assemblies, lunch times, how are they going to occupy themselves. So they tend to really stick rigidly to what they always do and they will not bend*" (T105).

7.4. Discussion

The main aim of the current study was to examine potential sources of variability in reputation management in autism. Adolescents' responses and those of their LSAs showed that the autistic adolescents were aware of their reputation and several students reported that they had explicitly attempted to manage their reputation in the past. Nonetheless, variability in reputation management was affected by (a) a desire to be true to oneself and (b) less understanding of social rules and their purpose. Autistic adolescents' friendships and their self concepts were also examined, and further suggested that autistic adolescents could be aware of their reputation. These results will now be discussed in turn.

Thematic analysis revealed that many of the autistic adolescents were aware of and at times concerned for their reputation, with some discussing specific changes in

behaviour they had deliberately made to impress others (i.e., explicit reputation management). This result was further supported by reports from the autistic adolescents' LSAs, and is also in line with experimental research evidencing self-presentation skills in autism (Begeer et al., 2008; Scheeren et al., 2010). Further, this result suggests that, like typical adolescents (Happé & Frith, 2013; Sebastian et al., 2008), autistic adolescents' behaviour could be driven by reputational concerns. These findings speak against a strict version of the theory of mind hypothesis, which claims that autistic individuals cannot think about what other people are thinking (Baron-Cohen et al., 1985). Although the current study did not measure ToM, the autistic adolescents' discussions evidenced that they could think about other's thoughts and be aware of their reputation, which is defined as a construct based on what other people think (Emler, 1990; Izuma, 2012). This result could support the idea that autistic individuals come to have an explicit ToM, but do not automatically think about others' thoughts and beliefs (Frith, 2004; Senju et al., 2009).

As discussed by the LSAs, the students, despite their autism, are still teenagers, who are exposed to a similar social context as their typical counterparts within the school, and that they worried about many of the same things, such as exams and friendships. However, having autism appears to result in the social environment being experienced or processed differently. The current study examined reputation management by focussing on the topic of being "cool", as many adolescents attempt to have a reputation for being "cool" (Danesi, 1994; Martino, 2000; Martino & Pallotta-Chiarolli, 2005). The autistic students could identify what it meant to be "cool", for example, by noting how "cool" people often had "style" and could be badly behaved. However, more than half of the students expressed that they did not want to be "cool" themselves. The results suggested that this reduced desire to be

seen as "cool" could be due, first, to a preference to being true to oneself, and, second, to difficulties in understanding social rules, or their purpose.

First, autistic adolescents reported that they would rather be true to themselves than be seen as "cool", with several students taking pride in their differences and being "who I am". Previous qualitative research has noted that some autistic individuals take pride in their differences (Humphrey & Lewis, 2008; Hurlbutt & Chalmers, 2002), and appreciating these differences, rather than attempting to fit autistic people into a conception of "normality", is perhaps key to enhancing understanding of how autistic individuals experience the social world (Milton, 2012). Other researchers (Frith & Frith, 2011; Schereen et al., 2010) have also previously suggested that reputation management may not occur due to a lack of hypocrisy and a preference for honesty. Together with the current findings, I suggest that some autistic adolescents may approach social experiences with a preference for being true to themselves, rather than to be seen as someone who they are not, thus striving for a reputation for being honest.

Interestingly, while autistic adolescents reported that they preferred to be true to themselves, their LSAs reported that they felt that their students had a desire to fit in. Previous research has also noted that some autistic adolescents report a desire to fit in (Daniel & Billingsley, 2010), and Carrington et al. (2003b) found that autistic adolescents reported using masquerading as a technique they used to fit in with other students. Consolidating these findings, it may be the case that autistic adolescents do have a desire to fit in with their peers, but they do not wish to fit in by conforming. Rather, as one student noted, they would like to be accepted for being different: "*if they don't like someone because they're different, well that to me isn't necessarily cool*". There may be conflicts between wanting to fit in with others and wanting to be

accepted for being different. In the current study, LSAs reported that they felt that the autistic students were largely accepted by their peers, although their non-autistic peers often perceived the autistic students as being different. Previous research has suggested that autistic adolescents often feel that their differences are viewed negatively by typical peers (Humphrey & Lewis, 2008) and typical adolescents acknowledge that being seen as normal is a key aspect of secondary school social life (Martino & Pallotta-Chiarolli, 2005) – suggesting that having a reputation for being different may be less accepted by typical adolescents.

Second, the autistic adolescents reported an inherent difficultly in understanding social rules, in particular the rules surrounding being "cool", and LSAs also described how their students were often "baffled" by social rules. Understanding of social rules could be related to explicit ToM (Frith & Frith, 2008a). The current findings imply, however, that something more than ToM is needed to explain variability in reputation management. Even if social rules can be explicitly learnt, the constant changing of these unwritten rules makes it difficult for autistic adolescents to keep track of what may constitute a good or "cool" reputation. Previous research suggests that autistic children are less flexible than typical children in applying social rules during moral reasoning (Shulman, Guberman, Shiling & Bauminger, 2012). Although they may be able to learn social rules, it appears that the flexible and unpredictable nature of social rules causes difficulties for autistic individuals. Autistic adolescents and LSAs reported that coping with unpredictability was a particularly challenging aspect of everyday life. Autistic individuals are known to have rigid and repetitive ways of behaving (APA, 2013), which could impact upon the ability to cope with unpredictability in the environment (Pellicano, 2013). This

difficulty could contribute to difficulties in understanding social rules, and ultimately, reputation management.

The current study also examined the autistic adolescents' friendships. All of the autistic adolescents reported that they had friends and had an understanding of different aspects of friendship, such as companionship and emotional support. Nonetheless, they were aware of the social challenges that they faced when it came to making friends. For example, several autistic adolescents noted how they found it difficult to make new friends, how strangers and observation could cause anxiety, and reported worries over others liking them. LSAs further reported that their autistic students' friendships had a different quality to typical students' friendships. Previous research has noted similar aspects of friendship in autism (Bauminger et al., 2003; Calder et al., 2013; Carrington et al., 2003b; Daniel & Billingsley, 2010; Locke et al., 2010). This evidence could support the idea that friendships may be a reputational incentive for those with autism, such that some autistic adolescents do want to and enjoy having friends, and thus may be motivated to manage their reputation for these friends. Indeed, some of the autistic adolescents did mention that they had, for example, researched computer games more to make their friends like them. It is important to note that some students expressed that they preferred their own company (see also Calder et al., 2013), and found social situations anxiety provoking. High social anxiety is frequently co-morbid in autism (Kuusikko et al., 2008; White et al., 2009b). Understanding precisely how social anxiety impacts upon reputation management is a potential avenue for future research.

Finally, autistic adolescents' direct and reflected self-evaluations were also considered, in an attempt to establish the autistic adolescents' self-concepts. In adolescence, how the self is defined is thought to be heavily dependent upon how we

believe others define us (Sebastian et al., 2008). According to this definition, one would expect considerable overlap between direct and reflected self-evaluations (Felson, 1993; Pfeifer, Masten, Borofsky, Dapretto, Fuligni & Lieberman, 2009). When asked to describe themselves, autistic adolescents tended to give overlapping direct and reflected self-evaluations. There did appear to be a shift, though, from describing the self in terms of personality (e.g., being nice) and physical (e.g., height or weight) traits when giving direct self-evaluations, to referring to personality and behavioural traits (e.g., being good at playing video games) when asked how others would describe them. These differences in self-evaluations suggest that autistic adolescents are aware that others could describe them differently to how they describe themselves. Some students found it particularly difficult to even guess how other people would describe them, which could relate to ToM or language ability. Nonetheless, autistic adolescents *do* have a self-concept (Lee & Hobson, 1998), which appears to have some relation to how they are seen by others. They are aware that other people can view them differently, which suggests that they are aware that they could have a reputation held by others. Future research, though, requires direct comparison between typical adolescents to further support this suggestion.

7.4.1. Limitations and future directions

The adolescents in the current sample were all part of autism provisions attached to a mainstream school, meaning that they spend portions of their time in the classroom with typical students (often with the support of school staff) and they also have separate lessons without the typical students (for example, some receive social skills lessons). This school environment is not the same for all autistic adolescents: for example, 55% of autistic individuals are estimated to have an IQ lower than 70 (Knapp, Romeo & Beecham, 2009) which results in more specialist education for

these individuals. Additionally, the school staff in this study all reported how their school delivered autism awareness training to school pupils, which is likely to impact on typical adolescents' knowledge and understanding of autism. Other schools in the UK may not deliver such training, and there is certainly no legislation that they have to (*cf.* Autism Act, 2009). Thus, the findings reported in this study may differ significantly in different schools. Future research should examine autistic adolescent's social experiences within a wider range of school settings, and perhaps the impact of autism awareness training upon typical adolescents' attitudes toward autism is also an area that requires further investigation.

Another point for future research could examine whether the reported desire to be accepted for being different has been taught. It could be the case that the adolescents with autism in this sample have explicitly been told (for example by parents or by teachers) that, although they are different to others, they should take pride in this fact. Qualitative research examining this concept of "being different" with autistic adolescents, parents, teachers and perhaps typical adolescents too, could be useful in identifying whether this is a concept that (a) is taught, (b) autistic adolescents identify with and (c) whether typical adolescents accept difference.

Overall, the current study provides further evidence for reputation management in autism – although variability in reputation management could be due to a preference for being true to oneself and difficulties with understanding social rules. The contribution of these factors to reputation management in autism has not previously been considered, and goes beyond the proposed mechanisms that were tested experimentally in previous chapters and were shown to have little contribution to reputation management. The current study therefore enables the development of new hypotheses for future research. The results also suggested that some autistic

adolescents are subject to the same social environment as their typical peers – but how they approach or process the social environment is likely to be different. Notably, autistic adolescents in the current sample found coping with the unpredictability of everyday life, in particular dealing with the unpredictably of social rules, as a substantial challenge. Additionally, being seen as different was a key theme – and these results have implications for acceptance and inclusion by challenging what most typical adolescents consider "normal". Finally, the current study demonstrates the importance of enabling young people on the autistic spectrum to speak out about their social experiences, in this instance by revealing new insights into reputation management in autistic adolescents.

Chapter Eight

General discussion

8.1. Introduction

This thesis examined reputation management in typical and autistic individuals, in order to enhance our understanding of how those with and without autism are influenced by other people. Specifically, I aimed to test whether individuals with autism manage their reputation, and to identify the mechanisms underpinning reputation management. Several experimental studies were conducted with the aim of directly testing reputation management in autistic adults (Chapter Two), typical children (Chapter Three) and autistic children (Chapter Five). Further experimental studies considered the possible mechanisms underpinning reputation management in typical children (Chapter Four) and autistic children (Chapter Six). Since Chapter Six could not identify mechanisms contributing to reputation management in autism, a further qualitative study (Chapter Seven) was conducted to develop further hypotheses concerning reputation management in autistic adolescents. I will now consider the main findings of each study and reflect upon their contribution to (1) theory surrounding reputation management, (2) our understanding of the mechanisms underpinning reputation management and (3) to theory surrounding social influence. I will also take into account the limitations of this thesis and avenues for further research.

8.2. Contribution to theoretical accounts of reputation management

First, Chapter Two demonstrated that adults with autism have the ability to manage their reputation, in contrast to conclusions reached by Izuma et al. (2011), who claimed that autistic adults were unable to manage their reputation. Although I showed that the ability to manage reputation was present in autism, the degree of reputation management demonstrated by autistic adults was significantly attenuated

in comparison to typical adults. The results of this study lent support for a distinction between implicit reputation management and explicit reputation management (Amodio & Frith, 2006; Shaw et al., 2013). Implicit reputation management involves automatically and subconsciously altering one's behaviour to manage reputation. Explicit reputation management involves deliberate and conscious altering of behaviour to maintain or obtain a certain reputation. Autistic adults did not appear to implicitly manage their reputation, but did show evidence for explicit reputation management.

Relatively little is known about reputation management during typical development. Thus, the proposed distinction between explicit and implicit reputation management was examined throughout typical development in Chapter Three, as this distinction had not previously been tested within the same group of children. Results showed that there were distinct developmental trajectories for the two aspects of reputation management. In accordance with previous self-presentation research (e.g. Aloise-Young, 1993; Banerjee, 2002a, 2002b) and research showing that 8-year-old children can explicitly report an understanding of reputation management (Hill & Pillow, 2006), evidence for explicit reputation management from 8 years was observed. Implicit reputation management, however, was not evident until later, as children entered adolescence, at 12 to 14 years of age. I propose that implicit reputation management is in fact learned, with an automaticity that develops over time, in particular during the adolescent years. Previous studies which claim reputation management is possible at 5-years-old (Engelmann et al., 2013; Leimgruber et al., 2012) do not test automatic, implicit reputation management – rather, they evidence a regulation of behaviour in fear of punishment or tattling from peers. Although this change in behaviour likely contributes to the development of implicit reputation

management, I argue that it is not until adolescence that individuals automatically regulate behaviour for the precise purpose of upholding their reputation (rather than to avoid punishment).

Adolescence is a milestone period, where social relationships with peers become of utmost importance (Jankowski et al., 2014) and friendships are particularly rewarding for adolescents (Albert et al., 2013; Chein et al., 2011; Hartup, 1993). As such, adolescents are known to take more risks in front of peers (Gardner & Steinberg, 2005; Chein et al., 2011) and to strive for an image of "coolness" (Danesi, 1994). Reputation, then, is of great importance to adolescents (Happé & Frith, 2013; Sebastian et al., 2008). During adolescence, skills in implicit reputation management are practiced, refined, internalised and, as a result, become automatic. This suggestion is related to the proposition that prosocial behaviour does not become automatic and less egocentric until mid-adolescence (van den Bos et al., 2011). Automaticity in prosocial behaviour could be linked to reputation, since adolescents who are more prosocial could also be better at managing reputation.

In Chapter Five, the same methods employed in Chapter Three were used to test reputation management in children with autism aged 7 to 14, with the findings of Chapter Three serving to inform our knowledge of reputation management in typical development. This study showed that children with autism did not implicitly manage their reputation, but that some were able to explicitly do so. Interestingly, a group of typically developing children matched to the autistic children on chronological age and verbal mental age behaved in a similar manner. This study further supports the notion that explicit and implicit forms of reputation management are distinct, and that some autistic individuals have the ability to explicitly manage their reputation.

There was no evidence for an automatic or implicit form of reputation management in either autistic adults or children. However, the reasons for this lack of implicit reputation management are likely to be different to those proposed for the lack of implicit reputation management noted in typical children (i.e. a protracted development), especially given the fact that typical, but not autistic, adults did implicitly manage reputation in Chapter Two. It may be the case that autistic individuals cannot *automatically* manage reputation. Missing this automatic ability could explain, in part, why autistic individuals continue to have pervasive social difficulties in everyday life. Limitations of the implicit reputation management task are discussed further in section 8.5. Nonetheless, autistic individuals do appear to be consciously aware that they can have a reputation.

Further qualitative analysis was conducted to identify new hypotheses for future research. Chapter Seven used semi-structured interviews to examine the concern for reputation in autistic adolescents. Autistic adolescents did report concerns for their reputation and could discuss times where they had deliberately attempted to manage their reputation, and this finding was supported by interviews with school staff. However, when asked about the concept of being "cool", it appeared that many of the autistic adolescents had little desire to be seen as "cool". Two particular themes were identified that could explain this reduced desire: (1) a desire to be true to oneself, and (2) a difficulty in understanding social rules and their purpose. I contend that difficulties in understanding social rules are driven in turn by autistic adolescents finding unpredictability particularly challenging. Given the inherently flexible and unpredictable nature of social life, this makes it difficult for autistic adolescents to figure out what constitutes a "cool" reputation.

Together, these studies have enhanced our understanding of reputation management in both typical and autistic individuals. This thesis contributes to our understanding of reputation management by demonstrating, across a number of studies, that the ability to manage reputation *is* possible in autism – whereas other studies on reputation management in autism have claimed that it simply is not (Chevallier et al., 2012b; Izuma et al., 2011). Testing for reputation management under a number of different experimental conditions, and qualitatively examining autistic individual's social experiences, clearly evidenced reputation management in autism.

8.3. Contribution to theory: mechanisms of reputation management.

Other studies have examined reputation management in autism (e.g. Chevallier et al., 2012b; Izuma et al., 2011), however these studies have only tested for the presence of the ability to manage reputation in autism – they did not attempt to directly test *why* this phenomenon may be less likely to occur in autistic individuals. The current thesis directly tested a number of possible mechanisms, which could potentially explain individual differences in reputation management.

Chapter Four attempted to identify the underlying mechanisms that may contribute to the developmental trajectories of implicit and explicit reputation management in typical development. Four mechanisms were proposed: ToM, social motivation, expectations of reciprocity, and inhibitory control. Analyses revealed that ToM was consistently related to explicit reputation management – suggesting that the ability to know the contents of others' minds is necessary for typical children to consciously manage reputation. This finding makes sense, given that our reputation is constructed of what other people think about us (Amodio & Frith, 2006; Banerjee and Yuill, 1999; Izuma, 2012; Izuma et al., 2010, 2011). Social motivation also contributed to

explicit reputation management, but not as predicted – that those with increased social motivation would be more likely to protect their reputation (Chevallier et al., 2012a). Instead, children who exhibited more social motivation (by deciding to play with someone rather than on their own) were more likely *not* to protect their reputation when it was explicitly at risk. This finding could reflect a general social desire to share information with others. Interestingly, there was little evidence that any of the proposed mechanisms could explain implicit reputation management, the reasons for which are considered in section 8.5.

Chapter Six examined the contribution of the four putative mechanisms to both explicit and implicit reputation management in children with autism, in an attempt to explain the variability in reputation management previously noted in this population. Previous hypotheses have focused on difficulties in social motivation and ToM as explanations for a lack of reputation management in autism (Chevallier et al., 2012a; Izuma et al., 2011). First, the diminished social motivation hypothesis of autism (Chevallier et al., 2012a) claims that autistic individuals lack social motivation, and as a result are unable to manage their reputation (Chevallier et al., 2012b). In Chapter Six, I directly tested social motivation, with a binary choice between playing alone or with another person, and with a friendship motivation questionnaire (Richard & Schneider, 2005). Like their typical counterparts, autistic children wanted to play with other people more than they wanted to play alone, and there was no difference between groups in friendship motivation scores. Further, qualitative results showed that the autistic adolescents who were interviewed had friends, appeared satisfied with their friendships, and school staff reported that these autistic students had a desire to fit in with others. These results support previous research examining autistic individuals' friendships (e.g. Bauminger et al., 2003; Calder et al., 2013; Carrington

et al., 2003b; Locke et al., 2010), and dispute the suggestion that autistic individuals lack social motivation, given this clear desire for friendships.

The results of Chapter Seven suggested that autistic adolescents had a reduced desire to be seen as "cool". Results further suggested that they (a) did not want to be "cool", since many were not impressed by "coolness", (b) they did not understand the rules of being "cool" and (c) they had difficulties in dealing with the unpredictability of these rules. It could be argued that these difficulties may be underpinned by reduced social motivation to learn these rules, however, it is worth noting that these same adolescents were motivated to have friends. Together, these quantitative and qualitative findings challenge the diminished social motivation hypothesis (Chevallier et al., 2012a). However, it is important to note that there is great variation in social motivation in autism, with some autistic adolescents in Chapter Seven describing how they ultimately preferred their own company, as other research has previously shown (Calder et al., 2013).

Proponents of the theory of mind hypothesis claim that autistic individuals have a specific difficulty in being able to think about others' thoughts (Baron-Cohen et al., 1985). Since reputation is imbued with thinking about what others think of the self (Izuma, 2012), it has been assumed that autistic individuals would not be able to think about their reputation (Izuma et al., 2011). However, in this thesis difficulties in ToM did not contribute to the ability to explicitly manage reputation in autistic children, and only weakly contributed to this ability in autistic adults. Further, there was no evidence for a specific ToM difficulty in the sample of autistic children in Chapter Six. Rather, they appeared to have a specific difficulty with story comprehension, as performance on *both* mental state and nature stories in the Strange Stories task (Happé, 1994; White et al., 2009a) was poorer than typical children's

performance, and performance was correlated with verbal ability. This finding could support the suggestion that language and the understanding of others' minds are substantially inter-related (Happé, 1995; Tager-Flusberg, 2000). Individuals with autism may use language with a more limited range of functions (Tager-Flusberg, 1997), have difficulties with grasping non-literal speech (Happé, 1993), and in following narratives (Tager-Flusberg & Sullivan, 1995) – skills which in typical development are thought to aid the understanding of others' minds (Tager-Flusberg, 2000). Language has also been suggested to be an important variable for reputation management. For example, language is essential for communicating social norms and spreading gossip (Smith, 2010), and for social competence by aiding relationship formation (McCabe & Meller, 2004) through consolidating social norm knowledge and social problem solving (Marshall, Hightower, Fritton, Russell & Meller, 1996). These findings also question the validity of the Strange Stories task (Happé, 1994). Autistic individuals may be able to solve the task by processing the task differently (Begeer et al., 2010; Brent et al., 2004; Kaland et al., 2008; Lind & Bowler, 2009), which would mean that scores on the Strange Stories task are not achieved using a theory of other minds. Given the contribution of ToM to reputation management in typical development, it cannot be discounted as a mechanism for reputation management – however, its contribution to reputation management in autism may be relatively weak.

In Chapter One, reciprocity was identified as an important, but previously unexamined mechanism for reputation management. Theoretically, reciprocity could contribute to reputation management in a number of ways. First, it could be used as a rule or metric by which individuals can judge the behaviour of others: those who are seen to act more reciprocally are more likely to be selected as partners in future

interactions (Phan et al., 2010). Second, individuals may manage their reputation because they expect others to reciprocate their efforts in some way, such as through indirect reciprocity where reputational information is passed to others (Engelmann & Fischbacher, 2009; Molleman et al., 2013). In this thesis, I found that reciprocity particularly contributed to the variation in autistic individuals' ability to manage reputation.

In Chapter Two, autistic adults expected others not to act reciprocally towards them (e.g. by returning favours), despite having high beliefs in the norm of reciprocity (e.g. that people really *should* return favours). These lowered expectations of reciprocity could reduce the degree of reputation management as they do not anticipate others will reciprocate their efforts. In Chapter Six, autistic children who were fairer during the reciprocity tasks were more likely to explicitly manage their reputation. These findings lead to the suggestion that the learning of social rules or norms, such as reciprocity and fairness, links to the ability to manage reputation in autism. Autistic individuals who are more likely to attempt to manage their reputation could be more aware of social norms and the fact that others could judge them on this basis (such as "nice" people being fair). Further, results from the qualitative study suggested that difficulties in dealing with the unpredictability of social norms could contribute to variability in reputation management in autism. As such, I suggest that autistic individuals can learn specific social norms (see also Schmitz et al., 2014), but due to the flexible and therefore unpredictable nature of these rules – for example, the fact that typical children acknowledge social norms but often do not abide by these (Sheskin et al., 2014; van den Bos et al., 2010) – the social world can be a very difficult place to navigate.

Inhibitory control was also suggested to be an important mechanism underlying reputation management, by inhibiting behaviours that could be detrimental to successful reputation management. However, no relationship between inhibitory control and reputation management was found for either typical or autistic children. Inhibitory control may not be necessary for reputation management to occur. However, further testing of this possible relationship is required before inhibitory control can be ruled out completely, since inhibitory control could be particularly important during adolescence (Crone, 2013; Steinberg, 2010), a time which I have suggested to be particularly relevant for the development of reputation management. It may also be the case that the use of only one task to measure inhibitory control, the go/no-go task, is not enough to describe an individual's ability to exhibit self-control. Although the go/no-go task is a standard task used in both the typical (e.g. Tamm, Menon & Reiss, 2002) and atypical (e.g. Happé, Booth, Charlton & Hughes, 2006) literature, executive function is multi-faceted, consisting of a multitude of abilities which are measured by numerous tasks (Huizinga et al., 2006). Other tasks designed to test self-control, such as the delayed gratification task (Mischel, Shoda & Rodriguez, 1989), or the colour-word interference task (Stroop, 1935), could also be tested and related to reputation management. Using a wider range of tasks to test self-control could provide more complete insight into its contribution to reputation management.

One issue that requires discussion is the developmental context in which the proposed mechanisms operate. Karmiloff-Smith (2009) notes that processes that are important at one, earlier, stage of development may no longer be important at a later stage. In terms of reputation management, it may be the case that ToM contributes to the early stages of typical reputation management development, by contributing to

understanding of reputation, but other abilities may also contribute to reputation management in later childhood and adolescence. Considering development within a dynamic context is of particular importance when examining developmental disorders, such as autism (Karmiloff-Smith, 1998). In particular, it is important to consider whether or not an apparent ability is underpinned by the same processes as in typical development (Karmiloff-Smith, 2009). Indeed, in the current thesis, my research suggested that the ability to explicitly manage reputation was underpinned by different mechanisms in typical and autistic children. The processes by which typical and autistic children come to manage their reputation are therefore different, and how these processes develop over time is also likely to be different. Theories of reputation management (e.g. Izuma, 2012) tend not to consider this ability in a developmental framework, despite the importance of this framework particularly in the study of autism (Burack et al., 2001). Although the current thesis was limited by sample size, thus preventing the testing of developmental trajectories (Karmiloff-Smith, 2009; Thomas, Annaz, Ansari, Scerif, Jarrold & Karmiloff-Smith, 2009), it did examine three stages of development – childhood, adolescence and adulthood – in an attempt to direct future hypotheses concerning reputation management in autism and typical individuals.

8.4. Social influence

Other people influence behaviour in a way that causes many individuals to attempt to manage their reputation, with concerns for reputation significantly underlying susceptibility to social influence. Social behaviour is thus determined to a large extent by reputation, across many different areas of life, such as at work or on the internet (Tennie et al., 2010). Reputation is therefore an important and relevant topic to research, and can inform theory surrounding social influence.

This thesis began with a question of "what does it mean to be social?" noting that a shared social world is thought to make humans unique (Frith & Frith, 2007). Reputation plays an important role in this social world – with some theorists arguing that reputation is "everything" (Shaw et al., 2013). Indeed, reputation is thought to have aided the evolution of cooperation (Barclay & Willer, 2007; Sylwester & Roberts, 2010) by encouraging individuals to cooperate and share with others in order to survive (Rand & Nowak, 2013; Tomasello et al., 2012; Tomasello & Vaish, 2013). This thesis examined the question of what it means to be social by considering the underlying mechanisms that contribute to the propensity for reputation management and by examining how autistic individuals manage reputation.

As previously discussed, I showed that typical children who are better at theorising about the contents of others' minds are more likely to explicitly manage their reputation. Being social therefore involves being able to think about others' minds. Second, many autistic individuals are exposed to a similar social context as typical individuals (such as the school classroom), however, the way in which they process and experience the social world is different to typical individuals (Milton, 2014). For example, if autistic individuals find that others do not reliably act in accordance with social norms (despite learning that people *should* do so) then this could lower their expectations that others will act according to social norms. In this way, the degree of social influence is, in part, determined by social experiences. Autistic individuals do appear to be capable of learning an expectancy of others' behaviour. This idea fits with Cottrell et al.'s (1968) social evaluation theory, which suggested that social influence occurs due to a learned expectancy that others will judge one's behaviour. I suggest that individuals with autism are not immune from learning this expectancy – but their expectancies likely differ to those held by typical individuals. Indeed, even

non-verbal children with autism have been shown to be capable of building social expectations (Nadel et al., 2000).

8.5. Limitations

I will now address several key areas of limitation in this thesis, including issues concerning the implicit reputation management task and validity. Further limitations within each of the studies are discussed in their corresponding chapter.

The implicit reputation management task did not highlight differences between a wide age range of typical children (aged 6 to 14), or between typical and autistic children, nor did any of the proposed mechanisms correlate with this task. There are two possible explanations for this result: either implicit reputation management is not evident in children of this age range, or that the task was not sensitive enough to detect group or individual differences. Considering the first suggestion, I have previously discussed (section 3.4) the proposition that implicit reputation management is a skill that becomes attuned and truly automatic in adolescence. Indeed, the results of Chapter Three did show a trend towards early adolescents automatically managing their reputation. Chapters Three to Six were conducted concurrently and informed by the limited current research examining reputation management in children (i.e. Engelmann et al., 2012; Leimgruber et al., 2012) which noted a form of implicit reputation management in 5-year-olds. I argue that this previous research taps some of the precursors to implicit reputation management – awareness that others could punish or reward the behaviour they witness.

Considering the suggestion that the task used may not have been sensitive enough, I argue that the task was designed to be developmentally-appropriate and to test the automatic, subtle behaviour changes noted in the adult literature, such as observation

causing an increase in charity donations in dictator games (Izuma et al., 2010, 2011). Economic games, such as the dictator game, were used throughout the quantitative studies of this thesis, and are frequently used as an experimental paradigm (Gummerum et al., 2008). However, the external validity of these games has previously been questioned (see below). Nonetheless, I argue that controlling the context in which the economic games occur enables the testing of experimental hypotheses: in this thesis, comparing behaviour in a situation with and without an observer directly tests whether changes in behaviour are related to the presence of an observer. By taking into account potential mechanisms of reputation management, one could also attempt to explain behaviour changes under observation.

Levitt and List (2007) express caution against generalising from economic games to the real world, with factors such as moral considerations, fear of scrutiny, and social context all affecting prosocial behaviour to varying degrees. Benz and Meier (2008) also note that prosocial behaviour is more accentuated in economic games, although behaviour in experiments is correlated with behaviour in real life. The dictator game has also been tested for validity in other non-Western cultures. Thomae et al. (2012) modified the dictator game for Cameroonian villagers by asking them to allocate rice resources. The villagers' behaviour was determined by gender and the amount of interaction between different groups of villagers, demonstrating the ability of the dictator game to be used in a range of settings. Gurven and Winking (2008), however, found no correlation between prosocial behaviour in economic games and real life prosocial behaviour in Amazonian villagers, finding instead that the villagers tended to act in the rational manner predicted by economic game theory (Thaler, 2000). Nonetheless, they note that economic games are still of value in providing novel insights into behaviour and social norms in different populations.

Economic games are important precisely because people do not act in an economically rational way (Ben-Ner, Putterman, Kong & Magan, 2004; Fehr & Gächter, 2000; Gintis, 2000; Kahneman, 2003), and how they depart from rationality is of key interest when it comes to social influence. Gummerum et al. (2008) also describe how economic games can be useful when examining the development of social preferences and norms, such as reciprocity. Benenson, Pascoe and Radmore (2007) note several strengths of the dictator game, including its simplicity and uniform procedure. The mixed methods approach of this thesis also enhances the validity of using economic games and an experimental approach in general.

It could be argued that some of the results may be limited in their application to real life, in particular to the life of an autistic person. Autism is a highly heterogeneous condition (APA, 2013), and the participants across the studies of this thesis may represent only a small part of the autistic spectrum, in that they were mostly male and of relatively high verbal ability and general intellectual functioning: despite the fact that over 50% of individuals on the autism spectrum also have an additional learning disability (Emerson & Baines, 2010). Nonetheless, this thesis does have real life applications, by showing that reputation can constitute part of some autistic people's social lives: they can be concerned for their reputation, and they can make efforts to manage it. Given the suggestion that reputation management may have a certain peak in adolescence (Sebastian et al., 2008), the qualitative results of this thesis are of particular pertinence. One in every 270 students in a mainstream school have an autism spectrum condition (Humphrey, 2008). Since education takes place in a social environment, it is important to consider how this social environment impacts upon learning. In particular, social expectations increase and peer relationships are considerably more important and complex in mainstream secondary schools (Adreon

& Stella, 2001). Therefore, this thesis does have results that could be generalised for autistic individuals who receive mainstream education.

Finally, it should also be noted that there can be a degree of circularity in attempts to explain social difficulties in autism, in which one aspect of social difficulty (for example, implicit reputation management) is explained by another aspect of social difficulty (for example, social norm learning). Causal explanations of the development of social difficulties in autism may well need to appeal to other, non-social mechanisms to reduce the risk of circularity. Future work could test such mechanisms by examining whether difficulties with implicit reputation management could be underpinned by non-social learning mechanisms, for example.

8.6. Future directions

The current thesis highlights a number of interesting avenues for future research. First, the study of reputation management in adolescence is of utmost importance in order to understand behaviour during this time, given the suggestion that this is a key period for the development of reputation management (Hepach et al., 2012; Sebastian et al., 2008). For example, peers are known to have a significant influence on alcohol use (Borsari & Carey, 2001; Osgood, Ragan, Wallace, Gest, Feinberg & Moody, 2013), smoking (Kobus, 2003), and non-suicidal self-injury (Prinstein et al., 2010; You, Lin, Fu & Leung, 2013). Brain-imaging research shows that adolescents' brains are especially sensitive to evaluation from peers (Somerville, 2013) and this evaluation is thought to affect how adolescents define the self (Sebastian et al., 2008). Adolescents are also thought to find social exclusion particularly aversive (Sebastian, Viding, Williams & Blakemore, 2010) – therefore, adolescence is considered a particularly sensitive time for social processing (Blakemore & Mills,

2014). Thus, examining reputation management during this time is of theoretical import, yet there is a lack of research experimentally testing the hypothesis that adolescents would be highly motivated by reputation. Some studies have noted that when observed by peers, increases in risk-taking can occur (Chein et al., 2011; Gardner & Steinberg, 2005), although the degree to which risk-taking behaviours are motivated by reputation is currently unclear.

Another potential avenue of research could examine reputational concerns specifically in girls with autism. Girls with autism are under-represented in research, perhaps due to girls being "missed" when it comes to diagnosis (Dworzynski, Ronald, Bolton & Happé, 2012). In the current thesis, girls with autism were in the minority, with no female adults in Chapter Two, six girls in the experimental studies (Chapter Five and Six) and one in the qualitative study. Considering the suggestion that girls may be better at "camouflaging" their autism, this ability could contribute to the difficulties in detecting autism in girls (Hiller, Young & Weber, 2014). If autistic girls are better at "camouflaging", then it would follow that they may be better at managing reputation. Indeed, Hiller et al. (2014) noted that girls in their sample were more likely to control their behaviour in public than boys. Recent research has suggested that girls with autism may have different social experiences: while autistic boys tend to be excluded from friendships, autistic girls are more likely to be simply overlooked by their peers (Dean et al., in press). Qualitative methods could be of use to examine this topic in autistic girls. Interestingly, in Chapter Seven several members of school staff described how one girl in particular (who did not take part in the research) appeared to be extremely concerned for her reputation. Whether this concern then manifests itself in subsequent reputation management is a matter for further investigation.

8.7. Conclusion

In conclusion, this thesis contributes to the field in a number of key ways, by enhancing our understanding of how both typical and autistic individuals are influenced by others in the context of reputation management. First, I showed that autistic adults do have the ability to manage reputation, although the propensity for reputation management was reduced in comparison to typical individuals. It appeared that this reduced propensity was related to expectations of reciprocity. Second, I showed that in typical development, a distinction between implicit and explicit reputation management does exist, with implicit reputation management having a protracted development and explicit reputation management appearing around 8-years-old. Further, the ability to explicitly manage reputation in typical development was underpinned by theory of mind and social motivation. These mechanisms had not previously been tested and directly related to reputation management. I further demonstrated that autistic children also had the ability to explicitly manage their reputation, and this ability was underpinned by reciprocal principles. Finally, qualitative methods further highlighted a concern for reputation in autistic adolescents – although variability in reputation management could also be underpinned by difficulties in understanding social rules.

Autistic adolescents struggled to see the point in being seen as "cool" by others, instead preferring to be true to themselves. In many ways, this preference to be honest – rather than deliberately manipulating others for reputational self-gain – leads to question whether typical individuals are in fact *too* concerned with their reputation (Frith & Frith, 2011). After all, reputation has been suggested to be "everything" (Shaw et al., 2013), and although it does have benefits in terms of encouraging cooperation and prosocial behaviour (Benabou & Tirole, 2005;

Semmann et al., 2005; Tennie et al., 2010), changing one's behaviour to impress others could have deceptive elements (Yu & Singh, 2003). The social difficulties and challenges faced by autistic individuals, however, cannot be downplayed. For example, autistic adults report a daily struggle of living with autism, including difficulties with employment and receiving support (Griffith, Totsika, Nash & Hastings, 2012), and autistic adolescents report that encounters with peers are frequently negative and hostile (Carrington et al., 2003a; Humphrey & Symes, 2010). Autistic individuals may not reap the benefits of being able to effectively manage reputation – for example, this reduced effectiveness could contribute to the ability to maintain friendships and to present one's self most effectively in job interviews. Reputation management is therefore of relevance to autistic individual's everyday lives. Overall, the current thesis demonstrates that individuals with autism are *not* completely immune to the effects of social influence.

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Appendix

Appendix A: Interview schedule for autistic adolescents

Thank you for speaking to me right now. We are going to have a chat about a few different things, just like we discussed a moment ago. I'd like to know more about you and your friends, and your time at school. I'll be recording our chat, but only the researchers on this project will hear this recording. If you don't want to answer any of my questions, you can tell me that, and you can also ask to stop at any time. Don't forget that I won't tell anyone else the answers you give, and your real name will be removed from everything later on when I write up your answers. Do you have any questions for me before we start?

There are four things we will be talking about. We'll tick off on this sheet when we've finished talking about each thing. First of all we'll have a chat about your school and what you get up to during your time at school and after school.

Questions in italics are additional prompts

School (warm-up Qs to build rapport)

- What year are you in? How are you finding it?
- What's your favourite subject?
- Do you go to any after school/lunch-time clubs?
- What's your favourite thing to do after school or on the weekend?

Friendship

That's great. Let's tick off that you have talked about your school. Now we are going to have chat about you and your friends.

- To start off with, I'd like to know more about your friends. Tell me about them.
    - *What are their names?*
    - *How did you meet them?*
    - *What do you like to do together?*
    - *What do you talk about with your friends?*
    - *Do you have any friends online? Can you tell me about them?*

- Let's talk more about your friends. What does being a friend mean to you?
    - *How do you know if someone is your friend?*
    - *How is a friend different from, say, a stranger in the street?*
    - *How do you know if your friends like you?*
    - *Would you like to have more friends?*
- If you wanted someone to be your friend, what would you do?
    - *Imagine there is a new person in your class. How would you make friends with them?*
    - *Let's think about people who are not your friends at the moment, for example, maybe there is someone in your class who you've never spoken to before. Would you like to be friends with them? Why/not?*
- Have you ever tried to change something so that other people will like you?
    - *Some people might change what they're doing or change what they're wearing to impress someone else. Have you done something like this? What was it?*
- Lots of people your age like to look or act 'cool'. Do you know what I mean by 'cool'?
    - *So I'm talking about people who are maybe popular or would like to be popular, they might be seen as 'cool'*
- What makes someone cool in your school?
    - *How do you know they're cool?*
- Do you want to be one of the cool people? Why/not?

Social anxieties

You're doing brilliantly. Let's tick off that we've finished talking about your friends. I've got a few more questions about things that might make you feel a bit worried or anxious.

- Can you tell me about the things that make you feel worried or anxious?
    - *Is there anything that makes you feel nervous?*
    - *How do you feel when you are around other people?*
    - *What about things that worry you in social situations?*
    - *How do you feel when you are working in a group?*

OK, that's great. Let's tick to say we've finished talking about that. I've got a few more questions to go. These one's are all about you.

- If someone asked me to describe myself, I might say that I am [2 personality traits and 1 physical trait]. If I asked you the same question, 'how would you describe yourself', what would you say?
    - *What kind of person would you say you are?*
- How do you think other people at your school would describe you?
    - *So I would guess that other people I know would describe me as [...]. How would you guess people you know would describe you?*
    - *How would your best friend/parents describe you?*

Appendix B: Interview schedule for school staff

Thanks so much for taking the time to talk to me today. I will be recording our chat, but only the other researchers on this project will hear the recording, and your real name will be changed when I write about your answers. If you don't want to answer any of my questions, you can tell me that, and we can also stop this interview at any time.

As you are aware, I've been talking with some of your students, and asking them questions about their friendships and their worries. I now have a few questions for you, about the students that you work with.

I'll just start by asking a few questions about your work. *Warm-up*

- So, can you talk me through what a typical day at work would involve for you?
    - *Do you work one-to-one with certain students?*

That's great. I'm now going to ask you a few questions about the students that you work with.

- How would you describe the students that you work most with?
    - *What kinds of things do they like doing?*
    - *How do they get along in class?*

- From your perspective, what kinds of things concern or worry the students you work with?
- What are the major challenges that your students have to face on a day-to-day basis?
    - *What about any social challenges?*
- Do any of your students appear to be worried about what others think about them?
    - *Can you think of an example?*
- Can you think of a time where a student has really struggled with getting along with their peers?
    - *Why do you think this happened?*
- Can you tell me a bit about the friendships you witness between your students and other students at the provision?
    - *Can you think of a particular friendship between two or three students?*
    - *How would you describe their friendship?*
- What about friendships between your students and other students outside of the provision, in the mainstream school?
    - *What about other students that they don't get along with?*
- How do you think the other students, without autism, in the mainstream school view the students with autism that you work with?
    - *Do you think that the other students accept them?*