The Effect of Autism Spectrum Disorder Behaviours on Perceived Deception and Credibility

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ABSTRACT

Research has demonstrated the existence of a pervasive stereotype that gaze aversion and fidgeting are indicators of deception (e.g., The Global Deception Research Team, 2006). However, studies on actual markers of deception have found that, contrary to popular belief, these behaviours are unreliable cues to deception (e.g., DePaulo et al., 2003). Coincidentally and unfortunately, gaze aversion and fidgeting are also characteristic behaviours of individuals with Autism Spectrum Disorder (ASD). It is proposed that the high similarity between perceived indicators of deception and common ASD behaviours may cause ASD individuals to be more vulnerable to being judged as deceptive and non-credible compared to their neurotypical peers.

To test this hypothesis, a series of five experiments was conducted. In Experiment 1 (N = 161), Experiment 2 (N = 463), Experiment 3 (N = 423), and Experiment 4 (N = 392), participants were shown short video clips of neurotypical individuals being interviewed and asked to indicate their impression of the individual's truthfulness or credibility. Each video either depicted one of five common ASD behaviours (gaze aversion, repetitive body movements, literal interpretation of figurative language, poor reciprocity, or flat affect), or no ASD behaviour (control condition). Despite the use of similar methodology across these experiments, there were large discrepancies in the findings of each one. Thus, to obtain a clearer overall picture of the effect of ASD behaviours on judgments of deception and credibility, a meta-analysis was conducted on the results of these four experiments. The meta-analysis revealed small but statistically significant effects of the five ASD behaviours on perceived deception and credibility.

Experiment 5 then examined whether a clinical sample of ASD individuals would be perceived as more deceptive and less credible than neurotypical controls, and if such an effect would be mediated by the degree to which they displayed each of the target behaviours.

Thirty ASD individuals (and 29 neurotypical controls) were recruited to participate in video-recorded interviews, which were then shown to participants (N = 1410) who rated the perceived truthfulness or credibility of the target individual. The results revealed that ASD individuals were perceived to be more deceptive and less credible than neurotypical individuals. However, this effect was not influenced by the presence of any of the target ASD behaviours, but only by the individual's overall presentation as having a disorder.

Taken together, the findings of this project suggest that within the current experimental paradigm, gaze aversion, repetitive body movements, literal interpretation of figurative language, poor reciprocity, and flat affect have only small effects on judgments of deception and credibility. Yet, despite this, ASD individuals were found to be perceived as more deceptive and less credible relative to neurotypical individuals. Though it is uncertain exactly why this is the case, this project is among the first to provide empirical evidence that ASD individuals may be vulnerable to biased deception and credibility judgments. Further research is necessary to investigate the underlying mechanisms by which ASD diagnosis influences perceived deception and credibility.

DECLARATION

I certify that this thesis does not incorporate without acknowledgment any material previously submitted for a degree or diploma in any university; and to the best of my knowledge and belief, does not contain any material previously published or written by another person except where due reference is made in the text.

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CHAPTER 1

Introduction

He does not answer questions, or they are evasive answers; he speaks nonsense, rubs the great toe along the ground, and shivers; his face is discoloured; he rubs the roots of the hair with his fingers; and he tries by every means to leave the house…

(Ayur-Veda, as cited in Trovillo, 1939, p. 849)

Overview

As early as 900 BC, in the writings of one of the Vedas (a collection of ancient religious texts), liars are described as demonstrating distinctive behavioural cues. Such writings demonstrate that, even thousands of years ago, society recognised the possibility that there may be behavioural indicators of deception and began to speculate on what those behaviours may be. Interestingly, over 2000 years later, many of the beliefs surrounding indicators of deception depicted then, such as signs of nervousness and increased hand and foot movements, are still held today. An international study conducted by the The Global Deception Research Team (2006) found that gaze aversion and fidgeting are the two most commonly perceived indicators of deception. It is both coincidental and unfortunate that these behaviours are also characteristic of another group of individuals – individuals with Autism Spectrum Disorder (ASD).

ASD is a neurodevelopmental disorder that is marked by (1) impairment in social and communicative functioning, and (2) the demonstration of restricted and repetitive patterns of behaviour and interests (American Psychiatric Association, 2013). A common behaviour among ASD individuals is the failure to maintain eye contact. Though opinions are divided as to the cause of such behaviour, research findings appear to be unanimous that ASD individuals demonstrate more gaze aversion than their neurotypical peers (Doherty-Sneddon, Whittle, & Riby, 2013; Klin, Jones, Schultz, Volkmar, & Cohen, 2002; Riby & Hancock, 2008). Furthermore, the repetitive patterns of behaviour demonstrated by ASD individuals often include repetitive movements, such as rocking, pacing, finger flicking, and hand or foot

tapping (Cunningham & Schreibman, 2008), which have been associated with perceptions of dishonest behaviour.

Given that ASD individuals do not noticeably differ in physical appearance from neurotypical individuals, ASD can at times be an invisible disability (Moyson & Roeyers, 2011). Therefore, to a naïve observer, behaviours such as gaze aversion and hand and foot movements that are actually common among ASD individuals may appear to be strange or suspicious. Though there are many ways in which symptoms of ASD can manifest, this project focused exclusively on behaviours that may overlap with perceived indicators of deception – namely, gaze aversion, repetitive body movements, inappropriate emotional displays, literal interpretation of figurative language, poor reciprocity, and flat affect. Specifically, this program of research examined whether the marked similarity between ASD behaviours and perceived behavioural indicators of deception causes ASD individuals to be perceived as more deceptive and less credible compared to their neurotypical peers.

This chapter will begin with an overview of the construct of deception and an examination of existing literature on behavioural markers of deception. The examination of the literature will include both perceived and validated markers of deception, as well as a discussion on the discrepancy between the two. The relationship between deception and source credibility will also be discussed, followed by a review of perceived behavioural markers of source credibility. The chapter will then highlight the ASD behaviours that overlap with perceived markers of deception and credibility, and the potential implications of such a relationship. Finally, an overview of the current thesis, its aims, and hypotheses, will be presented.

Deception

Deception is defined as the act of "intentionally, knowingly, and/or purposely misleading another person" (Levine, 2014, p. 379). Although lying (the act of intentionally

providing false information to another) is a common form of deception, it is not the only form (Levine, 2014). Other forms of deception include withholding (omitting important information), distortions (altering or misrepresenting important information), ambiguity (providing vague information), and changing the subject (Dunleavy, Chory, & Goodboy, 2010; McCornack, Morrison, Paik, Wisner, & Zhu, 2014).

Behavioural Markers of Deception

Judgments of deception are central to many real-world decisions. From criminal investigations to occurrences of academic dishonesty, individuals commonly make judgments of other people's veracity. It is no surprise, then, that researchers and lay people alike have been interested in identifying behavioural markers of deception. In a worldwide study involving 75 countries, The Global Deception Research Team (2006) asked participants from 58 countries the open-ended question, "How can you tell when people are lying?" It was found that gaze aversion was the most commonly perceived indicator of deception, with 63.66% of participants stating that liars avoid eye contact. In 51 of the 58 countries, gaze aversion was listed more frequently than any other characteristic. The next most common beliefs were that liars display signs of nervousness (28.15%), exhibit telling body movements (25.04%), and display increased hand and arm movements (10-15%).

The research team then conducted a follow-up study measuring the extent to which individuals perceived various behaviours to be associated with lying. Participants from 63 countries participated in this study, with 46 of those countries having participated in the previous phase. In line with their earlier findings, the results revealed that gaze aversion was again perceived to be the most telling sign of deception, with 71.5% of participants indicating that liars avoid eye contact. Repetitive body movements were also associated with judgments of deception, with 65% of respondents indicating that liars exhibit more postural shifts and 64.8% indicating that liars touch and scratch themselves more. Overall, these findings

demonstrate the existence of an overwhelming cross-cultural stereotype that gaze aversion is indicative of deception. This belief was found in all 75 countries involved in the study and was also the most prevalent and accessible belief about deception. These findings are in line with many other studies that have found that gaze aversion and body movements are not only believed to be signs of deception (e.g., Delmas et al., 2019; Granhag, Andersson, Strömwall, & Hartwig, 2004; Marksteiner, Reinhard, Dickhäuser, & Sporer, 2012; Strömwall & Granhag, 2003; Ulatowska, 2017; Vrij, Akehurst, & Knight, 2006), but also influence actual judgments of deception (e.g., Au & Wong, 2019; De Waele, Claeys, Cauberghe, & Fannes, 2018; Einav & Hood, 2008; Kraut & Poe, 1980; Slessor et al., 2012; Stiff et al., 1989; Willis & Wrightsman, 1995).

However, research on behavioural markers of deception has demonstrated that, contrary to popular belief, there is no evidence that gaze aversion and body movements are indicative of deception (DePaulo et al., 2003; Mann et al., 2013; Mann et al., 2012; Sporer & Schwandt, 2007; Vrij, 2019). In fact, a recent study by Luke (2019) suggests that there is currently insufficient information in the literature to reliably conclude the existence of *any* behavioural cue to deception, and the author cautions against the potential detriments of practices that claim otherwise. Yet despite the fact that they are unreliable cues, gaze aversion and body movements are pervasive stereotypes of cues to deception, held even by presumed "lie-experts" such as police officers, customs officers, prosecutors, and judges (Akehurst, Köhnken, Vrij, & Bull, 1996; Bogaard & Meijer, 2018; Bogaard, Meijer, Vrij, & Merckelbach, 2016; Delmas et al., 2019; Dickens & Curtis, 2019; Strömwall & Granhag, 2003; Vrij et al., 2006; Vrij & Semin, 1996). Why is this the case? Feldman and Chesley (1984) suggest that attribution theories (Kelley & Michela, 1980) can help in understanding the way in which an observer uses nonverbal cues in making judgments of deception.

Attribution theories posit that what an individual perceives to be the cause of another's behaviour forms the basis on which that behaviour is interpreted (Feldman & Chesley, 1984). To illustrate, imagine that Jane and Mary had arranged to meet their friend Susan for breakfast and are sitting in the café waiting for her to arrive. Thirty minutes pass and Susan is nowhere to be seen. Jane thinks to herself, "She must have overslept again. How inconsiderate!" Meanwhile, Mary thinks, "The trains must have been delayed again. Poor Susan!" Although both Jane and Mary observed the same behaviour, the way in which the behaviour was interpreted varied depending on what they attributed as the cause of the behaviour. When Jane perceived that Susan was late because she overslept, the behaviour was viewed as inconsiderate; however, when Mary perceived that Susan was late because her train was delayed, the behaviour was seen to be beyond Susan's control.

Attribution theories suggest that when an individual behaves in a way that is expected by the observer, there is little need for the observer to attribute a cause to the behaviour – it is simply accepted at face value. For example, if Susan had arrived on time, there would have been no reason for Jane or Mary to question *why* she arrived on time, as this behaviour is consistent with their expectations of how people should behave in such a situation. Based on this premise, Levine et al. (2000) and Bond et al. (1992) proposed the norm-violation model and expectancy-violation model of deception judgments, respectively. These models state that while nonverbal behaviours that are expected or normative are accepted at face value, nonverbal behaviours that are unexpected (Bond et al., 1992; Burgoon, 1983) or atypical (Levine et al., 2000) demand an explanation and raise suspicion about the sender's intentions. The authors argue that it is not the specific behaviours of gaze aversion or fidgeting per se that leads to deception judgments but the fact that these behaviours violate social norms and expectations, therefore prompting the observer to attribute a cause to the behaviour (Bond et al., 1992; Levine et al., 2000). They thus suggest that *any* behaviour that is incongruent with

either social norms (Levine et al., 2000) or the observer's expectations (Bond et al., 1992) can lead the observer to infer deception as a means of explaining the atypical behaviour.

To examine deception judgments in the context of attribution theories, Feldman and Chesley (1984) conducted a study in which subjects were presented with a videotaped simulation of a defendant's testimony in a pre-trial hearing. The defendant was accused of either a relatively major or minor crime, but in both cases, the verbal testimony was kept identical (the dialogue was vague such that content alone was insufficient to allow a judgment of guilt or innocence). The rationale was that participants would be more likely to expect a defendant to show signs of nervousness when being tried for a major crime than a minor crime (Feldman & Chesley, 1984). The defendant in the video displayed either behaviours that could be perceived as indicative of deception (e.g., body movements, pauses, hesitancy) or those that could be described as neutral. The subjects then indicated their impression of the defendant's believability.

The results revealed that defendants who displayed nonverbal behaviours associated with deception were rated as more believable if they were accused of a major crime as opposed to a minor crime. When the defendant displayed the target behaviours in response to a major crime, there was a match between the participants' expectations and the defendant's behaviour – it could be reasonably justified that these behaviours were the result of nothing more than the nerves associated with being tried for a major crime and the possibility of facing a heavy sentence. However, when the defendant displayed the same signs of nervousness for only a minor crime, there was an incongruence between the participants' expectations and the defendant's behaviour. As a result, participants were led to search for other plausible explanations for the defendant's behaviour, such as that the defendant was being deceptive.

Therefore, based on their knowledge of the target person's personal and situational conditions, observers attribute a cause to the target person's nonverbal behaviour, which then influences their judgment of the target person's veracity (Feldman & Chesley, 1984). In instances where multiple possible causes for a behaviour exist, Kelley (1971, as cited in Feldman & Chesley, 1984) proposes that the observer employs a "discounting principle" – as more plausible reasons for the behaviour come to light, the importance of each individual cause is diminished. The relative importance of a particular cause is evaluated based on the number and perceived significance of all possible alternative explanations.

For example, if an observer witnesses an individual fidgeting and avoiding eye contact while testifying in court, the observer may assume that the individual is being deceptive, but if the observer is aware that the individual has been diagnosed with ASD, the observer may be less likely to attribute deception as the cause of the behaviour (see Bond et al., 1992; Feldman & Chesley, 1984). However, given that ASD is unidentifiable by physical appearance, observers are unlikely to be aware of an individual's diagnosis and unlikely to expect behaviours such as gaze aversion and fidgeting. Therefore, when these behaviours are displayed, there is an incongruence between the observer's expectations and the individual's behaviour, thereby leading the observer to search for possible explanations for the behaviour, such as deception and non-credibility.

The Relationship between Perceived Deception and Perceived Credibility

A concept that is closely related to deception is that of source credibility. In an early study of the relationship between perceived deception and source credibility, O'Sullivan (2003) proposed that the performance of human lie detectors is subject to the fundamental attribution error, which she termed "the boy-who-cried-wolf effect." The fundamental attribution error is the tendency to overestimate the importance of dispositional traits of an individual and to underestimate the importance of situational factors (Ross & Nisbett, 1991).

O'Sullivan (2003) proposed that individuals are often unable to distinguish between trait truthfulness (whether the individual is trustworthy) and state truthfulness (whether the individual is telling the truth in that specific instance), resulting in the tendency to assume that trustworthy individuals always tell the truth and untrustworthy individuals are always deceptive.

To test this hypothesis, O'Sullivan (2003) carried out a study in which participants were shown 10 videos, each depicting an individual who was either lying or telling the truth about their opinion on one of two controversial topics (capital punishment for murderers and banning smoking in public places). Participants were then asked to indicate whether they thought the individual was lying or telling the truth, as well as their perception of the individual's trustworthiness. The results revealed that individuals who were perceived to be more trustworthy were also more likely to be perceived as telling the truth, regardless of the actual veracity of their statements; that is, perceptions of trustworthiness were negatively correlated with deception detection accuracy. Conversely, it was found that the participants who were most accurate in detecting deception were the ones who had a greater discrepancy between their state and trait ratings of trustworthiness – those who were able to recognise that trustworthy individuals do not always tell the truth and untrustworthy individuals are not always deceptive.

These findings are further supported by a study by George, Tilley, and Giordano (2014), which also found that the perceived credibility of an individual influences deception detection accuracy – individuals who were perceived to be less credible were more likely to be rated as being deceptive, which led to more successful detections but also more false alarms. In fact, perceived credibility has such a strong impact on perceived deception that a meta-analysis by Bond and DePaulo (2008) revealed that low-credibility truth-tellers were perceived as more deceptive than high-credibility liars. Therefore, in trying to develop an

understanding of perceived deception, it would be of significant benefit to take into consideration also factors that influence perceptions of credibility, as these factors are likely to influence perceptions of deception.

Source Credibility

In his book *Rhetoric*, Aristotle conceptualised *ethos* (source credibility) as comprising three components: intelligence, character, and goodwill. However, many modern operationalisations of source credibility have instead referred only to trustworthiness (i.e., Aristotle's component of character; e.g., Nurcombe, 1986; Porter & ten Brinke, 2009; Regan & Baker, 1998). McCroskey and Teven (1999) argue that there is no theoretical basis for eliminating any of the three dimensions of source credibility and that a simplified definition may not fully encapsulate the concept of source credibility. Thus, on the basis of Aristotle's conceptualisation, McCroskey and Teven (1999) conducted a factor analysis and successfully validated a measure of source credibility that comprises three dimensions: competence, character, and caring. *Competence* refers to the ability, expertise, and intelligence of an individual, *character* refers to the trustworthiness of an individual, and *caring* refers to an individual's goodwill and positive intention toward another (Dunleavy et al., 2010; McCroskey, 1971). The findings of McCroskey and Teven (1999) revealed that each of the three dimensions accounted for significant variance as unique predictors of believability and likableness, and the authors argue that rather than sum up the scores of all items in the measure to form one measurement of source credibility, the use of all three individual dimensions in the operationalisation of source credibility would be the most appropriate.

Behavioural Markers of Source Credibility

It is important to note that the majority of the following research was not based on the three-dimension conceptualisation of source credibility and may reflect an incomplete picture of its behavioural markers. However, given that limited research has made use of a holistic

operationalisation of source credibility, it is nonetheless beneficial to review all current literature on source credibility. Research has found that a widespread cue used to infer credibility is confidence (e.g., Brewer & Burke, 2002; Cutler, Penrod, & Stuve, 1988; Jules & McQuiston, 2013; McClure, Myers, & Keefauver, 2013; Penrod & Cutler, 1995; Price & Stone, 2004; Sporer, Penrod, Read, & Cutler, 1995; Tenney, Small, Kondrad, Jaswal, & Spellman, 2011). Thomas and McFadyen (1995) propose the existence of what they termed a "confidence heuristic," in which individuals judge the credibility of a statement based on the level of confidence with which it was expressed. They argue that there may be a social norm that individuals are expected to convey a level of confidence that is proportionate to the amount or accuracy of information they actually possess (Thomas & McFadyen, 1995). This conjecture is supported by research that has shown that confidence appears to be a universal cue to credibility, with children as young as five years old relying on confidence as an indicator of credibility (Tenney et al., 2011). In contrast to confidence, gaze aversion and fidgeting are common signs of nervousness, and thus it is no surprise that individuals who display such behaviours have been found to be perceived as less credible than those who do not (Neal & Brodsky, 2008; Reinhard & Sporer, 2008).

In the same way that individuals are expected to convey a level of confidence that is congruent with the amount of information they possess, individuals are also expected to convey emotions that are congruent with the valence of the information they possess (Heath, 2009; Kaufmann, Drevland, Wessel, Overskeid, & Magnussen, 2003; Melinder, Burrell, Eriksen, Magnussen, & Wessel, 2016; Regan & Baker, 1998; Wessel, Magnussen, & Melinder, 2013). For example, a recent meta-analysis of 20 studies by Nitschke, McKimmie, and Vanman (2019) found that the level of distress displayed by rape victims significantly influenced the degree to which they were perceived as credible complainants. In one of those studies, conducted by Kaufmann et al. (2003), participants were shown videos of the

testimony of a (staged) rape victim who either strongly or ambiguously rejected the advances of the suspect and who displayed either congruent, neutral, or incongruent emotions. In the congruent emotion condition, the victim displayed emotions that would be expected of a rape victim, such as being upset, crying, and occasionally hesitating to respond. In the neutral emotion condition, the victim displayed flat affect. In the incongruent emotion condition, the victim displayed positive emotions that would not be expected of a rape victim, such as smiling. The results revealed that the emotions displayed by the victim strongly influenced participants' judgments of her credibility, with participants rating the victim as significantly more credible when she displayed negative emotions compared to when she displayed positive or neutral emotions. Furthermore, the effect of displayed emotion on judgments of credibility was present regardless of the content of the story. The perceived credibility of the victim who clearly rejected the suspect's advances as well as the one who was more obscure were both influenced by the emotions displayed during the testimony, leading the researchers to conclude that "it is not what you say that determines credibility, but how you say it" (Kaufmann et al., 2003, p. 30).

What was arguably most concerning about the findings of Kaufmann et al. (2003) was that participants were oblivious to the fact that they were relying on the emotions displayed by the victim when making their judgments of credibility. Participants in all conditions reported that both the content of the testimony and the manner in which it was conveyed were equally important factors in determining their perception of credibility. This tendency to rely on emotional displays in forming credibility judgments once again raises the question of whether ASD individuals, who have difficulties with social functioning and emotion regulation, would be perceived as less credible than their neurotypical peers.

Autism Spectrum Disorder

Overview of Autism Spectrum Disorder

ASD is a neurodevelopmental disorder that is marked by (1) impairment in social and communicative functioning, and (2) restricted and repetitive patterns of behaviour and interests (American Psychiatric Association, 2013). These symptoms arise in the early developmental period of life and cause significant impairment in adaptive functioning (American Psychiatric Association, 2013). Recent estimates suggest that the global prevalence of ASD is 62/ 10,000[1] (approximately 1 in 161; Elsabbagh et al., 2012). Although there are a variety of behaviours through which symptoms of ASD can manifest, the following review will focus specifically on those that overlap with perceived markers of deception and non-credibility, namely, gaze aversion, repetitive body movements, inappropriate emotional displays, and flat affect.

Gaze Aversion

One of the characteristic features of ASD is a deficit in nonverbal communication, often demonstrated by atypical gaze behaviour (American Psychiatric Association, 2013). Indeed, research has shown that ASD individuals demonstrate different patterns of gaze behaviour from their neurotypical peers (Cañigueral & Hamilton, 2019; Doherty-Sneddon et al., 2013; Freeth & Bugembe, 2019; Kliemann, Dziobek, Hatri, Baudewig, & Heekeren, 2012; Riby & Hancock, 2008; Senju & Johnson, 2009; Tottenham et al., 2014). Research on gaze behaviour in typically developing children suggests that between the ages of five and six years, children begin to learn to use gaze aversion as a means of modulating cognitive load; that is, gaze aversion enables children to reduce the number of competing stimuli they have to attend to, thus allowing greater cognitive resources to be directed toward the task at hand

[1] These estimates were calculated prior to the publication of the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5; American Psychiatric Association, 2013).

(Doherty-Sneddon et al., 2013). However, prior to the age of five years, typically developing children demonstrate significantly less gaze aversion than older children and adults, and they do not consistently avert their gaze in response to cognitively demanding tasks (Doherty-Sneddon et al., 2013). In contrast, studies using retrospective home-video analyses appear to suggest that signs of atypical gaze behaviour in children with ASD can be observed at as early as one year of age, even before the child receives a formal diagnosis of ASD (Clifford, Young, & Williamson, 2007; Maestro et al., 2005; Osterling & Dawson, 1994). In addition, while most typically developing children exhibit gaze aversion during the thinking and speaking phases of a conversation, Doherty-Sneddon et al. (2013) found that children with ASD exhibited twice as much gaze aversion as their peers during the listening phase of a conversation.

Stereotypy

Another diagnostic feature of ASD is the presence of restricted and repetitive behaviours and interests (American Psychiatric Association, 2013). "Stereotypy" is a broad term that refers to behaviours that fall in this category (Cunningham & Schreibman, 2008). According to Berkson (1983, as cited in Rapp & Vollmer, 2005), a behaviour is classified as stereotypy if it meets the following criteria: (1) the behaviour is performed voluntarily, (2) the behaviour is invariable, (3) the behaviour continues over time, (4) the behaviour persists even when environmental conditions change, and (5) the behaviour is age-inappropriate. Though they share similar features, stereotypy may present very differently in each ASD individual and can be categorised into one of two general forms (Turner, 1999). The first encompasses low-level behaviours involving repetitive movements, such as hand flapping, spinning, tapping, and rocking (Cunningham & Schreibman, 2008; DiGennaro Reed, Hirst, & Hyman, 2012; Goldman et al., 2009; Turner, 1999), or repetitive vocalisations (Lanovaz & Sladeczek, 2012). Recent estimates suggest that approximately 51.8% to 88% of individuals

with ASD exhibit this form of stereotypy to some degree (Chebli, Martin, & Lanovaz, 2016; Melo et al., 2019). The second form involves higher-level, or more complex, behaviours, such as the insistence on sameness, fixation on a specific part of an object or activity (e.g., only playing with the wheels of a toy car), or having restricted interests (Cunningham & Schreibman, 2008; Turner, 1999). Stereotypy emerges at a young age in children with ASD and differences in the frequency of stereotypic behaviour between children with ASD and typically developing children can be observed at as young as two years of age (MacDonald et al., 2007; Morgan, Wetherby, & Barber, 2008).

Inappropriate Emotional Displays

Another common deficit in nonverbal communicative behaviour among ASD individuals is atypical emotion regulation (Mazefsky, 2015; Richey et al., 2015). Emotion regulation refers to the "internal and external processes responsible for monitoring, evaluating, and modifying emotional reactions (especially their intensity and timing) to accomplish one's goals" (Thompson, Meyer, & Jochem, 2008, pp. 431-432). ASD individuals often have maladaptive methods of emotion regulation (Samson, Wells, Phillips, Hardan, & Gross, 2015), which can lead them to react impulsively and inappropriately when emotional; for example, through tantrums or self-injury (Mazefsky et al., 2013; Samson, Hardan, Lee, Phillips, & Gross, 2015; Sofronoff, Attwood, Hinton, & Levin, 2007).

In addition to difficulties with emotion regulation, ASD individuals also often fail to adequately make use of social guidelines for emotional expression (Barbaro & Dissanayake, 2007; Wieckowski, Swain, Abbott, & White, 2019; Zane, Neumeyer, Mertens, Chugg, & Grossman, 2018). A study by Begeer et al. (2011) found that when asked to make decisions on whether particular emotional displays were appropriate, children with ASD relied more on learned scripts than personal experience. Begeer et al. (2011) suggest that children with ASD are able to learn behavioural rules that are taught to them (e.g., "Say thank you") but often

fail to understand, apply, and integrate these rules into their social interactions. This is supported by further research that has found that children and adolescents with ASD differ significantly from their typically developing peers in their ability to judge whether a behaviour is socially appropriate (Loveland, Pearson, Tunali-Kotoski, Ortegon, & Gibbs, 2001; Nah & Poon, 2011). Children with ASD were unable to explain *why* a particular behaviour (e.g., "laughing in response to a sad announcement") was appropriate or inappropriate, often providing irrelevant justifications or no justification, instead of justifications that reflected social awareness (Loveland et al., 2001; Nah & Poon, 2011). Nah and Poon (2011) argue that these findings highlight the fact that ASD individuals rely on idiosyncratic non-social interpretations when making decisions in social situations. As a result, ASD individuals may violate standards of socially acceptable behaviour without even realising it.

Flat Affect

Deficits in nonverbal communication among ASD individuals can also manifest through a lack of facial expressions (American Psychiatric Association, 2013). For example, in a recent study, Zantinge, van Rijn, Stockmann, and Swaab (2019) examined the relationship between physiological arousal and emotional expression of fear among children with and without ASD. They found that among typically developing children, the higher the level of physiological arousal experienced, the more intense their facial and bodily expressions of fear. However, there was no relationship between physiological arousal and emotional expression among children with ASD. Though these findings are preliminary, they suggest that while ASD individuals experience similar physiological changes in response to emotion, they may not express emotion in the same way that neurotypical individuals do.

Reduced facial expressivity is not only a noticeable characteristic of ASD individuals but also one that influences others' perceptions of them. Stagg, Slavny, Hand, Cardoso, and

Smith (2014) examined this notion by recording videos of four child actors with ASD and four typically developing child actors and presenting these videos to adult participants to rate the level of expressivity of each child. The videos were muted in order to avoid any influence of the actors' language abilities and to direct the participants' attention toward the actors' facial expressions. The results revealed that participants perceived the actors with ASD to be significantly less expressive than the typically developing actors. Following these findings, Stagg et al. (2014) then conducted a second study in which they showed the same video clips to children aged 10 to 11 years and asked the children whether they would want to be friends with the actors. It was found that even though the children were not aware of the diagnosis of the actors, they were able to discriminate between the actors with and without ASD and reported a significantly lower desire to be friends with the actors with ASD.

Poor Reciprocity

The studies that comprise this thesis will also introduce two other characteristic behaviours of ASD individuals that could potentially be viewed as indicative of deception and non-credibility: poor reciprocity and literal interpretation of figurative language. Although little attention has been paid to these behaviours in the deception literature, they could possibly be seen as forms of ambiguity or changing the subject.

As part of their difficulty with social-emotional reciprocity, ASD individuals are often known to have trouble maintaining two-way conversation (American Psychiatric Association, 2013). Due to impairments in their ability to understand the perspective of their conversation partner, ASD individuals may talk exclusively about their own interests, failing to recognise that this may not be of interest to the listener (Chin & Bernard-Opitz, 2000). ASD individuals may also be less responsive to cues for turn-exchange and have difficulty conforming to appropriate norms for the timing and latency of turn-taking (Paul, Orlovski, Marcinko, & Volkmar, 2009). For example, in a discourse analysis by Dean, Adams, and Kasari (2013),

the narratives of a seven-year-old girl with ASD, Cindy, and three of her peers were examined. The findings highlighted several ways in which Cindy's narratives differed from those of her peers. Firstly, Cindy told far more stories than her peers – almost as many stories as all three of her peers combined. Being unable to understand and abide by the unspoken rule of turn-taking, Cindy's stories were often ignored or objected to by her peers. In addition, Cindy's stories were also about restricted topics. Despite her peers being disinterested in her stories and urging her to talk about something else, Cindy persisted. This resulted in Cindy being teased, mocked, and excluded from the group's activities. These findings suggest that the inability to conform to social norms for reciprocity and turn-taking may cause ASD individuals to experience difficulties in social situations, as reflected in diagnostic criterion A1 in the DSM-5 (American Psychiatric Association, 2013).

Literal Interpretation of Figurative Language

Research has consistently demonstrated that ASD individuals perform more poorly than their neurotypical counterparts on tasks that require the understanding of figurative language (Cheung et al., 2019; Saban-Bezalel, Dolfin, Laor, & Mashal, 2019; Saban-Bezalel & Mashal, 2019), which reflects diagnostic criterion A2 in the DSM-5 (American Psychiatric Association, 2013). For example, in a study by MacKay and Shaw (2004), 19 children with ASD aged eight to 11 years were compared with age-matched peers on their ability to understand the meaning of six different types of figurative statements: hyperbole (an exaggeration of the actual situation), indirect request (a request presented in the form of a question or statement), irony (a comment that highlights the incongruence of an event), metonymy (the use of ad hoc labelling of individuals or objects), rhetorical question (a question that does not require an answer), and understatement (a statement that downplays the actual situation). It was found that across all types of figurative statements, children with ASD performed worse than their typically developing peers. Furthermore, a study by

Rundblad and Annaz (2010) found that while the understanding of metaphors and metonymies among typically developing children increased with age, the developmental trajectory of children with ASD showed no improvement with increasing chronological age.

Autism Spectrum Disorder and Deception

From the review of the literature, considerable similarities between ASD behaviours and commonly perceived indicators of deception and non-credibility are evident. However, research has shown that rather than being masters of deception, ASD individuals are actually less likely to deceive others (Baron-Cohen, 1992; Ma et al., 2019; Sodian & Frith, 1992; Talwar et al., 2012; Yi et al., 2014) and less able to identify when others are being deceptive toward them (Williams, Nicholson, Grainger, Lind, & Carruthers, 2018; Yang et al., 2017; Yi et al., 2013; Zhang et al., 2019) compared to neurotypical individuals. This places ASD individuals in a vulnerable position – they face difficulties understanding and identifying deception, but at the same time, others perceive common ASD behaviours to be indicative of deception and non-credibility.

Given that many forms of social interaction involve some degree of impression formation, misinterpretation of ASD behaviours has the potential to cause detrimental consequences for ASD individuals (see Denault & Jupe, 2018; Porter & ten Brinke, 2009; Vrij & Turgeon, 2018). For example, in a study by Culbertson, Weyhrauch, and Waples (2016), it was found that it was *perceived* deception, rather than *actual* deception, that influenced the outcome of a mock job interview. If the interviewee was perceived by observers as being truthful, the outcome of the job interview was more favourable than if they were perceived as being deceptive, regardless of whether they were actually telling the truth. These findings suggest that if ASD individuals are indeed more susceptible to being perceived as deceptive as a result of their characteristic behaviours, they may be at an unfair disadvantage compared to their neurotypical peers.

The Current Research Project

The current research project aimed to examine whether ASD individuals are more likely than neurotypical individuals to be judged as deceptive and non-credible, and if so, whether this difference is attributable to the overlap between common ASD behaviours and perceived indicators of deception. To do so, the project was carried out in two broad phases. In the first phase, I examined whether the behaviours of gaze aversion, repetitive body movements, inappropriate emotional displays, literal interpretation of figurative language, poor reciprocity, and flat affect led to increased perceptions of deception and non-credibility. Although researchers have investigated the use of gaze behaviour, body movements, and emotional displays as behavioural markers of deception and credibility, to the best of my knowledge, no study has yet been conducted to examine the effect of poor reciprocity and literal interpretation of figurative language on judgments of deception and credibility. However, these behaviours could potentially be seen as forms of ambiguity or changing the subject.

Attribution theories (Kelley & Michela, 1980) propose that while behaviours that are consistent with social norms are simply accepted at face value, behaviours that are inconsistent with social norms raise suspicion and demand attention (Feldman & Chesley, 1984). Therefore, in the case of deception judgments, unexpected nonverbal behaviours prompt the observer to query the sender's motives. Bond et al. (1992) and Levine et al. (2000) highlight that this response is not limited to particular types of nonverbal behaviour, but applies to any behaviour that is unexpected or atypical. Based on this assumption, I propose that literal interpretation of figurative language and poor reciprocity may also be viewed as indicative of deception and non-credibility.

Turn-taking is a central component of any social conversation, as the very definition of a conversation implies the involvement of two or more parties. The conversational turn-

taking system runs on a minimal overlap, minimal gap principle: speakers rarely speak at the same time, and the period of time between turns is short (Levinson, 2016; Stivers et al., 2009). In addition, it is also highly flexible to accommodate different types of social interaction (Levinson, 2016). To achieve successful turn-taking, English speakers rely on various aspects of language, such as lexicosyntax (patterns of words) and prosody, to infer when it is their turn to speak in a conversation (Casillas & Frank, 2017; Stivers et al., 2009). However, despite the complexity underlying turn-taking, there is evidence that children are able to make predictions about the turn structure of a conversation from as early as two years of age (Casillas & Frank, 2017). Furthermore, studies have also described remarkable similarities in the way in which turn-taking occurs in different cultures and languages (Stivers et al., 2009). Likewise, studies on the use of figurative language have shown that children aged eight to 10 years are able to understand and use figurative language (Pollio & Pollio, 1974) and that by age 11, children are able to identify the communicative intent behind a range of figurative statements (Demorest, Silberstein, Gardner, & Winner, 1983). This suggests the expectation that by adulthood, one would have the ability to both predict and finish their turn in a social conversation, as well as be proficient in the use of figurative language.

Thus, when individuals exhibit poor reciprocity or respond inappropriately to figurative language, this expectation is violated. In line with attribution theories (Kelley & Michela, 1980), observers are then prompted to scrutinise the reasons why this behaviour was exhibited (Feldman & Chesley, 1984). Because ASD is an invisible disability, observers may think it unlikely that an individual who has the appearance of otherwise normal intelligence is incapable of engaging in turn-taking or understanding figurative language – tasks that even children are able to do. Instead, it may seem more plausible that the individual is attempting to deceive by avoiding or changing the topic of conversation. Given that these behaviours are

common among ASD individuals, it was deemed to be valuable to study whether (like gaze aversion, repetitive body movements, and incongruent emotional expression) poor reciprocity and literal interpretation of figurative language would also negatively influence perceptions of deception and credibility.

The second phase of the project then aimed to understand how these behaviours would affect judgments of deception and credibility specifically toward ASD individuals. Because ASD occurs on a spectrum, the range and intensity of symptoms experienced can differ substantially from person to person, and no two individuals are exactly alike. It was therefore important to consider this large variability in presentations in investigating whether ASD individuals are more vulnerable to being perceived as deceptive and non-credible than their neurotypical peers. To do so, I compared judgments of deception and credibility toward ASD individuals and neurotypical individuals, and evaluated whether these perceptions were influenced by the degree to which the target ASD behaviours were displayed.

Overall, it was hypothesised that (1) individuals who display gaze aversion, repetitive body movements, inappropriate emotional displays, literal interpretation of figurative language, poor reciprocity, or flat affect would be perceived as more deceptive and less credible than individuals who do not display these behaviours, and (2) ASD individuals would be perceived as more deceptive and less credible than neurotypical individuals.

Summary of Chapters

Chapter 2 presents the findings of a series of three experiments which aimed to empirically examine whether the presence of common ASD behaviours (namely, gaze aversion, repetitive body movements, inappropriate emotional displays[2], literal interpretation of figurative language, poor reciprocity, and flat affect) would lead to increased judgments of

[2] Preliminary analyses suggested that inappropriate emotional displays could not be successfully manipulated within the current experimental paradigm. Thus, in the interest of maintaining consistency across all conditions of ASD behaviour, the inappropriate emotional displays condition was subsequently excluded. These findings are discussed further in Chapter 2.

deception and non-credibility. Despite the use of similar methodology across these three experiments, there were large discrepancies in the results of each one. Therefore, to obtain a clearer overall picture of the findings, a meta-analysis was conducted. The meta-analysis revealed small but statistically significant effects of five ASD behaviours on judgments of deception and credibility. It was hypothesised that the small effect sizes may have been due to the context of the stimulus videos used in these three experiments, in which the target individuals did not have any apparent motive to deceive.

Therefore, I then examined whether the effect of ASD behaviours on judgments of deception and credibility would be stronger in situations where the target individual has an obvious incentive to be deceptive (Chapter 3). The results revealed that even under these circumstances, only certain ASD behaviours were found to have statistically significant effects on ratings of deception and credibility. This inconsistency in findings between experiments suggests that these effects are weak, in contrast to past studies which have demonstrated large effects of certain ASD behaviours (e.g., gaze aversion) on perceived deception and credibility. One possible explanation for this discrepancy is that the effect of ASD behaviours on judgments of deception and credibility may be moderated by a number of other variables, such as situational factors, demographic characteristics, and the presence of other verbal and nonverbal cues.

To examine how these behaviours would influence judgments of deception and credibility specifically toward the ASD population, thirty ASD individuals (and 29 neurotypical controls) were recruited to participate in short video-recorded interviews (Chapter 4). For each video, the presence of each of the five target ASD behaviours was coded by a research assistant who was blind to the purpose of the study and group membership of the individuals. The videos were then shown to participants who rated the extent to which they believed the target individuals were deceptive or credible. Using

multilevel structural equation modelling (MSEM), ASD diagnosis was found to be a significant predictor of perceived deception, competence, and character. However, these relationships were not mediated by the presence of any of the target ASD behaviours.

Chapter 5 presents a general discussion of the findings and their practical implications. Limitations and suggestions for future research are also discussed.

CHAPTER 2

The Effect of Autism Spectrum Disorder Behaviours on Perceived Deception and Credibility

EXPERIMENT 1

The purpose of this experiment was to examine whether the portrayal of ASD behaviours, specifically gaze aversion, repetitive body movements, inappropriate emotional displays, literal interpretation of figurative language, poor reciprocity, and flat affect, causes individuals to be perceived as deceptive and non-credible. It was hypothesised that individuals who display gaze aversion, repetitive body movements, inappropriate emotional displays, literal interpretation of figurative language, poor reciprocity, or flat affect would be perceived as more deceptive and less credible than individuals who do not display these behaviours.

Stimulus Development

Seven Caucasian Australian males aged between 20 and 30 years were involved in the production of stimulus videos for use in this experiment. Of these individuals, five were university students and none had any professional acting experience. Each individual was filmed during an interview in which they were asked several biographical questions (e.g., "When and where were you born?" see Appendix A). The individuals were not informed of the questions prior to the interview, but were simply instructed to answer all questions truthfully.

An interview involving biographical questions was chosen as the context for the stimulus videos as there is minimal incentive for individuals to be deceptive in such a scenario, thus reducing the likelihood of perceived motivation being a confounding variable. In addition, asking biographical questions also allowed the individuals involved to answer naturally, spontaneously, and truthfully. The interview was broken down into seven segments, and in each segment, the individual was instructed to display one of the seven conditions of ASD behaviour being examined (see Table 1). In all videos, the target individual was seated facing the camera, with only their upper body in the camera frame. The

interviewer was seated directly behind the camera, and therefore, was not visible in the videos. Each video segment was approximately two minutes long.

Table 1

Operationalisations of Conditions of ASD Behaviour (Experiment 1)

Condition of ASD Behaviour	Operationalisation
Gaze Aversion	The individual gazed downward or to either side throughout the interview.
Repetitive Body Movements	The individual demonstrated repetitive body movements throughout the interview (e.g., fidgeting, scratching his body, swaying back and forth).
Inappropriate Emotional Displays	The individual displayed at least one emotional reaction that was inappropriate for the topic of conversation (e.g., laughing while talking about racial discrimination).
Literal Interpretation of Figurative Language	The individual responded literally to the question, "Can you tell me about a time when you had *a bitter pill to swallow*?"
Poor Reciprocity	The individual talked continuously and in great detail about a particular topic of interest, without regard for the interviewer.
Flat Affect	The individual did not exhibit any (or limited) facial expression or vocal intonation throughout the interview.
Control Condition	The individual was not instructed to display any particular nonverbal behaviour.

Preliminary Study 1

After the stimulus videos were developed, a manipulation check was conducted to ensure that the videos successfully captured the intended ASD behaviours.

Participants

Haphazard sampling was used to recruit 99 participants (60 female), ranging in age from 18 to 64 years (M = 28.36, SD = 8.89, Mdn = 26.13). Forty-nine participants were undergraduate psychology majors at Flinders University who received course credit for their participation, and 50 participants were recruited via the online crowdsourcing platform TurkPrime (Litman, Robinson, & Abberbock, 2017). Eighty-seven participants spoke English as their first language, and 26 participants were fluent in more than one language. The study was approved by the Flinders University Social and Behavioural Research Ethics Committee.

Materials

Stimulus materials. As discussed above, a total of 49 video segments were developed as stimulus materials (seven segments per target individual), with each segment depicting one of the seven conditions of ASD behaviour (see Table 1).

Identification of behaviours. Participants were shown a list of 12 behaviours, which included the six target behaviours (gaze aversion, repetitive body movements, inappropriate emotional displays, literal interpretation of figurative language, monologue [poor reciprocity], flat affect) and six distractors (hesitation, high pitch, blushing, speech errors, fast talking, inconsistency; see Appendix B). Following each video, participants were asked to indicate which (if any) of the behaviours on the checklist had been displayed by the individual in the video. Participants were allowed to select more than one behaviour for each video (see Appendix C).

Procedure

The study was presented through an online survey platform (Qualtrics, Provo, UT). Participants first provided demographic information, including gender, age, education level, and first language. They were then shown the definitions of 12 behaviours and asked to familiarise themselves with these definitions. Next, participants were presented with seven

short videos of individuals being interviewed. Videos were presented such that each participant was shown one video from each of the seven target individuals and from each of the seven conditions of ASD behaviour. The order of presentation of the videos was randomised across participants. After viewing each video, participants were presented with a checklist containing the 12 behaviours and asked to indicate which (if any) of these behaviours had been displayed by the individual in the video.

Results

The ratings from the 49 videos were collapsed into a total of seven groups according to condition of ASD behaviour: gaze aversion, repetitive body movements, inappropriate emotional displays, literal interpretation of figurative language, poor reciprocity, flat affect, and control condition (i.e., no ASD behaviour displayed). For each of the six target behaviours, a McNemar test with Bonferroni correction was conducted to examine whether the proportion of participants who identified the target behaviour changed when the behaviour was present (target condition) versus absent (control condition). The test was found to be statistically significant for all six ASD behaviours: gaze aversion [$\chi_c^2(1, N = 99) = 51.75, p < .001$], repetitive body movements [$\chi_c^2(1, N = 99) = 39.45, p < .001$], inappropriate emotional displays [$\chi_c^2(1, N = 99) = 34.24, p < .001$], literal interpretation of figurative language [$\chi_c^2(1, N = 99) = 35.56, p < .001$], monologue (poor reciprocity) [$\chi_c^2(1, N = 99) = 21.19, p < .001$], and flat affect [$\chi_c^2(1, N = 99) = 42.37, p < .001$]. These results indicated that the participants' identification of a target behaviour as being present was associated with the actual presence of the target behaviour in the video.

Because participants were allowed to select more than one behaviour per video, the most frequently identified behaviours for each condition (as indicated by the percentage of participants who selected the behaviour) were also examined. As shown in Table 2, in addition to the intended target behaviour, the presence of other nonverbal behaviours was

also detected in each video. However, the design of the current study did not allow for the influence of these behaviours to be statistically controlled. Although this was a limitation of the stimulus videos, the intended target behaviour was the most frequently identified behaviour in each of their respective conditions, and thus, the videos were deemed to be acceptable for use in Experiment 1.

Table 2

Most Frequently Identified Behaviours for Each Condition of ASD Behaviour

Condition of ASD Behaviour	Most Frequently Identified Behaviours
Gaze Aversion	Gaze Aversion (87.88%) Hesitation (40.40%)
Repetitive Body Movements	Repetitive Body Movements (83.84%) Hesitation (36.36%)
Inappropriate Emotional Displays	Inappropriate Emotional Displays (52.53%) Repetitive Body Movements (42.42%)
Literal Interpretation Of Figurative Language	Literal Interpretation of Figurative Language (45.45%) Monologue (30.30%)
Poor Reciprocity (Monologue)	Monologue (61.62%) Repetitive Body Movements (42.42%)
Flat Affect	Flat Affect (75.76%) Hesitation (43.43%)
Control Condition	Repetitive Body Movements (35.35%) Monologue (32.32%) and Hesitation (32.32%)

Preliminary Study 2

For each condition of ASD behaviour, interview questions were selected such that they provided a suitable context for the demonstration of the target behaviour. For example, the questions, “Could you tell me about the happiest time of your life?” and “Could you now tell me about a time when you had *a bitter pill to swallow*?” were asked in the literal

interpretation of figurative language condition, whereas only one question ("Could you tell me about what you like to do in your free time?") was asked in the poor reciprocity condition as the individual then spoke for the rest of the duration of the video (see Appendix A). In addition, in order to ensure that the stimulus videos were as natural as possible, the individuals were not informed of the interview questions prior to the interview. As a result, the verbal content of each interview varied according to the individual and the specific interview questions asked in each condition. Therefore, prior to Experiment 1, it was first necessary to ensure that the verbal content of the interviews (independent of the presence of ASD behaviours) were not rated differently on measures of deception – that is, that the statements made in each interview were perceived to be equally truthful. To do so, all interviews were transcribed and presented to a second group of participants who were asked to indicate whether they believed the individual was telling the truth.

Participants

Haphazard sampling was used to recruit 121 participants (43 female), ranging in age from 18 to 74 years (M = 34.87, SD = 11.23, Mdn = 31.38) via the online crowdsourcing platform TurkPrime (Litman et al., 2017). A priori sample size estimations using G*Power 3.1 (Faul, Erdfelder, Lang, & Buchner, 2007) suggested that a minimum sample size of 17 participants would be required to detect a medium effect (f = .25) at an alpha level of .05 and power of .80 in a one-way repeated-measures ANOVA with seven measurements (based on a correlation of .50 between measures). One hundred and fifteen participants spoke English as their first language, and 26 participants were fluent in more than one language.

Materials

Stimulus materials. The 49 videos that were developed were transcribed, and these transcripts were used as stimulus materials in the present study. The videos were transcribed verbatim, including all fillers (e.g., "uhm," "uh"), repeated words, incomplete phrases, and

pauses. Similar to Preliminary Study 1, the transcripts were allocated such that every participant viewed a transcript from each of the seven individuals and each of the seven conditions. The order of presentation of the transcripts was randomised across participants.

Perceived deception. Following each transcript, perceived deception was measured with a single question, "Do you think this person was telling the truth?" on a 6-point Likert scale ranging from 1 (*deceptive*) to 6 (*truthful*).

Procedure

The study was presented through an online survey platform (Qualtrics, Provo, UT). Participants first provided demographic information, such as gender, age, education level, and first language. Participants were then asked to read seven transcripts of individuals being interviewed, and after each transcript, they were asked to indicate their impression of the target individual's truthfulness.

Results

The ratings from the 49 transcripts were collapsed into a total of seven groups according to the condition of ASD behaviour of the original video: gaze aversion, repetitive body movements, inappropriate emotional displays, literal interpretation of figurative language, poor reciprocity, flat affect, and control condition. A one-way repeated measures ANOVA was then conducted to examine if the seven conditions differed on ratings of perceived deception. The test was found to be statistically significant, $F(6, 720) = 6.42$, $p < .001$, $\eta_p^2 = .05$, 90% CI [.02, .07][3]. Pairwise comparisons using Fisher's LSD procedure revealed that transcripts from the inappropriate emotional displays and flat affect conditions were perceived to contain significantly more deceptive information compared to transcripts from the other five conditions.

[3] Given that *F*-tests are one-sided and the *F*-statistic cannot be negative, it is recommended that 90% confidence intervals be used for values of partial eta-squared when testing hypotheses at an alpha level of .05 (Steiger, 2004). This is equivalent to the 95% confidence intervals of two-sided tests (Steiger, 2004).

Follow-up analyses were then conducted by comparing the ratings of the seven individuals within each condition, in order to identify if the difference was due to the responses of a particular individual. A one-way independent ANOVA revealed that there was a significant difference in ratings of perceived deception between the seven individuals in the inappropriate emotional displays condition, $F(6, 114) = 3.16$, $p = .01$, $\eta_p^2 = .14$, 90% CI [.02, .20]. Post hoc comparisons using the Tukey HSD test showed that individual "G" was rated as significantly more deceptive than individual "A" ($p = .01$) and individual "B" ($p = .02$), both of whom did not differ from all other individuals. Similarly, a separate one-way independent ANOVA revealed that within the flat affect condition, there was a significant difference in ratings of perceived deception between the seven individuals, $F(6, 114) = 6.20$, $p < .001$, $\eta_p^2 = .25$, 90% CI [.11, .32]. Post hoc comparisons using the Tukey HSD test showed that individual "B" and individual "G" were rated as significantly less deceptive than the other five individuals, who did not differ from one another.

The analyses were then repeated with the exclusion of the transcripts of individual "G" from the inappropriate emotional displays and flat affect conditions, and individual "B" from the flat affect condition. However, the results revealed that the seven conditions continued to differ on ratings of perceived deception even after the exclusion of individual "G" from the inappropriate emotional displays condition [$F(6, 606) = 2.58$, $p = .02$, $\eta_p^2 = .02$, 90% CI = .002, .04], individual "G" from the flat affect condition [$F(6, 612) = 7.47$, $p < .001$, $\eta_p^2 = .07$, 90% CI = .03, .09], individual "B" from the flat affect condition [$F(6, 618) = 7.86$, $p < .001$, $\eta_p^2 = .07$, 90% CI = .03, .10], and all three simultaneously [$F(6, 396) = 4.99$, $p < .001$, $\eta_p^2 = .07$, 90% CI = .03, .11].

Therefore, in order to account for differences in the verbal content of the interviews, an additional control group was added to Experiment 1. Participants in this control group were asked to read the transcripts of the interviews and to indicate their impression of the

target individual's truthfulness and credibility. These ratings were then used as the baseline from which the ratings of deception and credibility of the experimental group (who viewed the stimulus videos) were compared.

Method

Design

A 2 (Experimental Group: experimental group, control group) × 7 (ASD Behaviour: gaze aversion, repetitive body movements, inappropriate emotional displays, literal interpretation of figurative language, poor reciprocity, flat affect, control condition) mixed design was used. The dependent variables for this study were perceived deception and perceived credibility.

Participants

Haphazard sampling was used to recruit a total of 161 participants (89 female), ranging in age from 18 to 64 years (M = 30.39, SD = 9.63, Mdn = 28.39). With an alpha level of .05 and power of .80, the estimated sample size needed to detect a medium effect (f = .25) for the interaction between experimental group and ASD behaviour is a minimum of 18 participants, based on a correlation of .50 between measures (G*Power 3.1; Faul et al., 2007). Sixty-two participants were undergraduate psychology majors at Flinders University, and 99 participants were recruited via the online crowdsourcing platform TurkPrime (Litman et al., 2017). One hundred and fifty participants spoke English as their first language, and 32 participants were fluent in more than one language.

Materials

Stimulus materials.

Experimental group. As previously discussed, a total of 49 video segments were developed as stimulus materials for the experimental group in the present study. Each video was approximately two minutes long and depicted an individual portraying one of the seven

conditions of ASD behaviour (i.e., no ASD behaviour for the control condition) while being asked biographical questions. Each participant in the experimental group was shown seven of the 49 video clips; the videos were allocated such that every participant viewed each of the seven individuals and each of the seven conditions of ASD behaviour, once. The assignment of individuals to conditions of ASD behaviour and the condition order were counterbalanced simultaneously using a pair of Latin squares developed by Lewis (1989).

Control group. The 49 videos used as stimulus materials for the experimental group were transcribed, and these transcripts were used as stimulus materials for the control group. The videos were transcribed verbatim, including all fillers (e.g., "uhm," "uh"), repeated words, incomplete phrases, and pauses. Similar to the experimental group, each participant in the control group was shown seven of the 49 transcripts, and the same method of counterbalancing was used.

Perceived deception. Perceived deception was measured with a single question, "Do you think this person was telling the truth?" Participants provided their response on a 7-point Likert scale, which ranged from 1 (*deceptive*) to 7 (*truthful*).

Perceived credibility. Participants were asked to rate the perceived credibility of each target individual using a modified version of the 18-item measure of source credibility by McCroskey and Teven (1999). This measure consists of three subscales of six items each, with each subscale reflecting one of the credibility dimensions proposed by Aristotle: Competence, Caring, and Character (see Appendix D). Items on this measure were rated on a semantic differential scale, with higher scores indicating higher levels of perceived credibility. Sample items include "incompetent/ competent," "self-centred/ not self-centred," and "untrustworthy/ trustworthy." Three items within the Caring subscale were adapted to improve the relevance of the items to the present context: "cares about me/ doesn't care about me," "has my interests at heart/ doesn't have my interests at heart," and "concerned with me/

unconcerned with me" were modified to "cares about the interviewer/ doesn't care about the interviewer," "has the interviewer's interests at heart/ doesn't have the interviewer's interests at heart," and "concerned with the interviewer/ unconcerned with the interviewer," respectively. The instructions for completing the measure were also slightly modified to better suit the purpose of the present study: "Please indicate your impression of the person noted below by circling the appropriate number between the pairs of adjectives below. The closer the number is to an adjective, the more certain you are of your evaluation," was modified to "Please indicate your impression of the person in the interview by selecting the appropriate point between the pairs of adjectives below. The closer the number is to an extreme, the more accurate you consider that description to be."

Procedure

The study was presented through an online survey platform (Qualtrics, Provo, UT). To avoid response bias, participants were not informed of the true purpose of the study but were instead told that the study aimed to investigate deception detection accuracy. Upon clicking the survey link, participants were randomly allocated to either the experimental group (n = 80) or the control group (n = 81). Depending on their experimental group, participants were then asked to either watch seven short videos of individuals being interviewed (experimental group) or read seven short transcripts of individuals being interviewed (control group). After each video or transcript, participants were asked to indicate their impression of the target individual's truthfulness and credibility. To avoid potential carry-over effects, the order in which participants were asked to provide their judgments of deception and credibility differed for each participant: 94 participants provided judgments of deception followed by judgments of credibility, and 67 participants provided judgments of credibility followed by judgements of deception. Participants were debriefed on the true purpose of the study at the end of the experiment.

Results

Evaluation of Credibility Model Fit

McCroskey and Teven's (1999) measure of source credibility is suggested to comprise three factors of six items each: Competence, Caring, and Character. To test the model fit, a confirmatory factor analysis (CFA) using maximum likelihood (ML) estimation was carried out on the present data set using IBM SPSS Amos 23. Because a within-subjects design was used in Experiment 1, each participant completed the measure of source credibility a total of seven times (once per condition of ASD behaviour). Therefore, to ensure the independence of observations, responses were randomly selected such that only one response per participant was included in the analysis (N = 161).[4] The three factors in the present model were allowed to co-vary. The first variable of each factor was fixed to a loading of 1. The error terms for the observed variables were assumed to be independent of all other error terms.

Prior to the analysis, the assumptions of univariate and multivariate normality were assessed. The assumption of univariate normality was violated for one item, with a standardised value of skewness of -3.40. There was also significant multivariate non-normality, with Mardia's coefficient (measure of multivariate kurtosis) of 143.59 (standardised estimate of 33.95). As traditional maximum likelihood estimation is highly sensitive to violations of normality, bootstrapping (Efron & Tibshirani, 1986) was employed to assess the model fit as bootstrap methods are not dependent on the assumption of

[4] It is acknowledged that the random sampling of observations resulted in the loss of a substantial amount of data. However, no evidence was available to guide the specification of a higher-level factor structure, nor could it be assumed that the factor structure and factor loadings at each level of the model were equal, suggesting that the use of multilevel confirmatory factor analysis (MCFA) may not be appropriate (see Wu, Lin, Nian, & Hsiao, 2017). Although alternative MCFA approaches have recently been proposed to overcome these limitations, limited information is available as yet on the performance of these techniques in analysing models with more than one factor (Wu et al., 2017). Therefore, given that the aim of the confirmatory factor analysis was simply to validate the proposed factor structure of McCroskey and Teven's (1999) measure of source credibility (and that the higher-level factor structure of the model was not of any theoretical significance), the random sampling approach used was thought to be adequate for the purpose of this study.

normality (Ichikawa & Konishi, 1995). A total of 2000 bootstrap samples were used. The model fit was therefore further assessed using the Bollen-Stine corrected *p* value instead of the traditional maximum likelihood *p* value. The results indicated that the hypothesised three-factor model was a poor fit for the data, and thus, respecification of the model was pursued through post hoc adjustments. The adjustments and corresponding indices of fit are summarised in Table 3 and detailed in Appendix E.

Table 3

Goodness-of-Fit Indices for McCroskey and Teven's (1999) Measure of Source Credibility (Experiment 1)

Model	Goodness-of-Fit Measure				
	χ^2	*df*	TLI	CFI	RMSEA
Optimal value [a]	-	-	> .95	> .95	< .06
Hypothesised three-factor model	491.31***	132	.85	.87	.13
Single-factor model	883.48***	135	.70	.73	.19
Respecified Model 2; three-factor model, items Ca5[5] and Ca6 deleted	341.80***	101	.89	.90	.12
Respecified Model 3; three-factor model, items Ca3 and Co2 deleted	204.37**	74	.93	.94	.11

Note. TLI = Tucker-Lewis index; CFI = comparison fit index; RMSEA = root mean square error of approximation.
[a] Hu and Bentler (1999)
**$p \leq .01$, ***$p \leq .001$

Although the TLI, CFI, and RMSEA values of respecified Model 3 still fell short of the optimal values of > .95, > .95, and < .06, respectively (Hu & Bentler, 1999), there were no standardised residual covariance values greater than |2.58| (Byrne, 2001), no items that

[5] Items are labelled by subscale and item number, with Co, Ca, and Ch, indicating items from the Competence, Caring, and Character subscales, respectively.

cross-loaded onto more than one factor, and no standardised item loadings below .50 (Hair, Black, Babin, & Anderson, 2010). Therefore, Model 3 was taken to be the best-fit model for the purpose of this experiment (see Figure 1).

Standardised item loadings ranged from .73 to .89 for the factor Competence, .84 to .94 for the factor Caring, and .85 to .92 for the factor Character. There was a correlation of .71 between the factors Competence and Caring, .69 between Caring and Character, and .78 between Competence and Character. Given that the factor loadings of the items in the model were fairly consistent (ranging from .73 to .94), for simplicity, each item in the measure was weighted equally in the calculation of the Competence, Caring, and Character subscale scores. Cronbach's coefficient alpha values were .91 for the Competence subscale, .93 for the Caring subscale, .96 for the Character subscale, and .96 for overall Credibility. These estimates are similar to those found in the original validation study by McCroskey and Teven (1999). Therefore, for the for the purpose of this experiment, perceived competence, caring, and character, were operationalised as follows in Table 4.

Table 4

Operationalisations of Perceived Competence, Caring, and Character

Variable	Operationalisation
Perceived Competence	The sum of scores on items 1, 3, 4, 5, and 6 of the Competence subscale of McCroskey & Teven's (1999) measure of source credibility, with higher scores indicating higher levels of perceived competence.
Perceived Caring	The sum of scores on items 1, 2, and 4 of the Caring subscale of McCroskey & Teven's (1999) measure of source credibility, with higher scores indicating higher levels of perceived caring.
Perceived Character	The sum of scores on all items of the Character subscale of McCroskey & Teven's (1999) measure of source credibility, with higher scores indicating higher levels of perceived character.

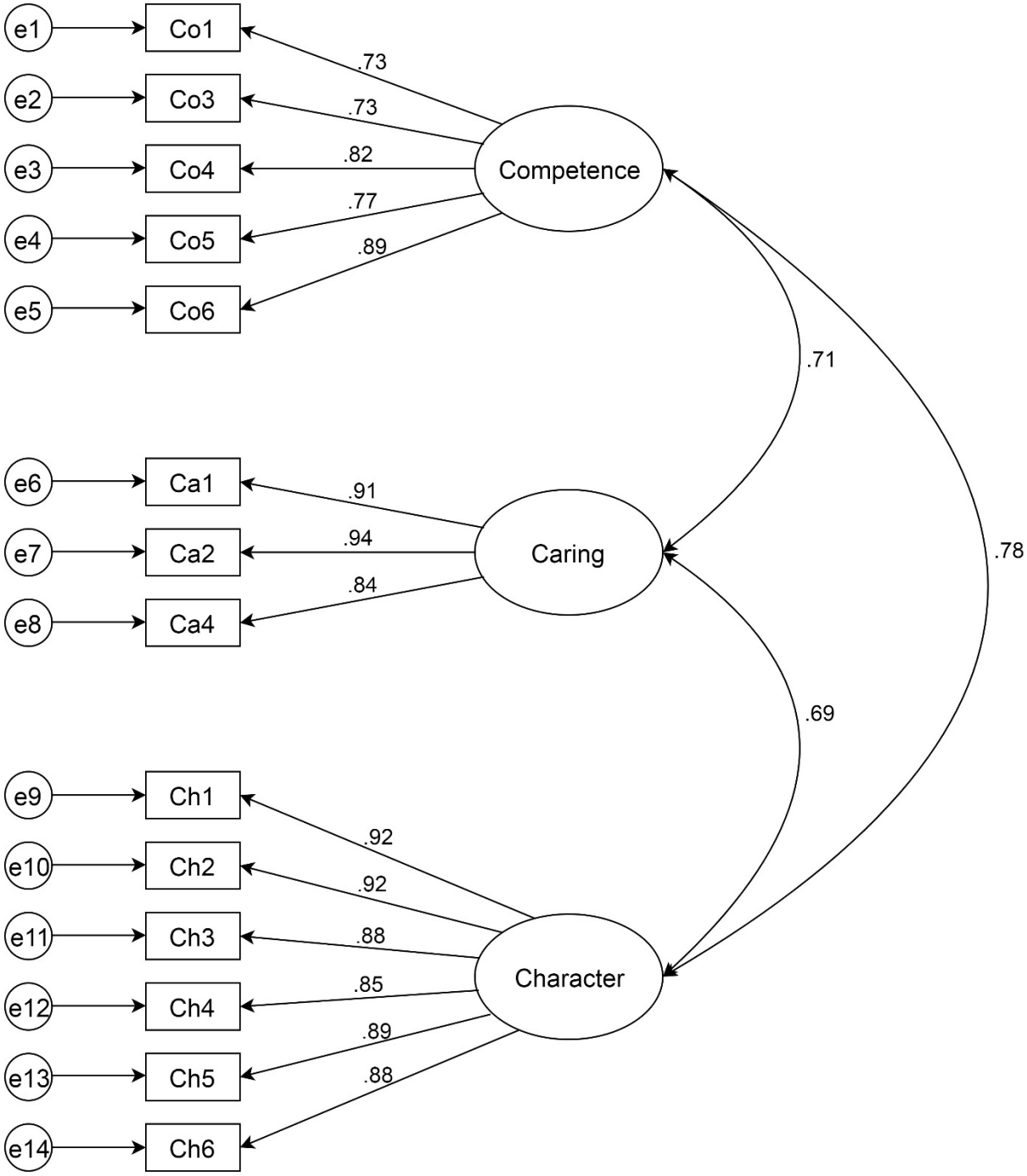

Figure 1. Standardised coefficients for the revised model of McCroskey and Teven's (1999) measure of source credibility (Experiment 1).

Hypothesis Testing

Profile analyses (see Tabachnick & Fidell, 2013) using IBM SPSS GLM were performed on the deception, competence, caring, and character ratings of the seven conditions of ASD behaviour: (1) gaze aversion, (2) repetitive body movements, (3) inappropriate emotional displays, (4) literal interpretation of figurative language, (5) poor reciprocity, (6) flat affect, and (7) control condition (i.e., no ASD behaviour displayed). Profile analysis uses multivariate analysis of variance (MANOVA) to examine data where either one dependent variable is measured several times, or several dependent variables are measured at one time (Tabachnick & Fidell, 2013). Profile analysis can therefore be used to examine whether two (or more) groups show the same pattern (i.e., profile) of scores across different measurement points (Desjardins & Bulut, 2017).

A profile analysis consists of three major tests: the test of equal levels, the test of flatness, and the test of parallelism. The test of equal levels examines whether, on average, one group scores higher than another across all measurements. With regard to the present data set, for example, the test of equal levels would answer the question, is the overall mean rating of deception of the experimental group higher than that of the control group? The test of flatness examines whether within each group, there are differences in scores between measurements. For example, within the experimental group, are ratings of deception higher in the gaze aversion condition than in the poor reciprocity condition? The test of parallelism is the primary test of a profile analysis, as it examines whether the pattern (i.e., profile) of scores across measurements is the same for each group. Thus, in relation to the present data set, the test of parallelism would examine whether the differences in level of perceived deception between conditions of ASD behaviour depend on whether participants watched videos (experimental group) or read transcripts (control group) of the interviews. The null

hypothesis of the test of parallelism is that the way in which scores vary across measurements is similar for both groups.

When a data set contains more than two groups or more than two measurements, significant deviations from parallelism can arise from multiple possible sources. As this test only indicates whether or not such a difference is present, six interaction contrast analyses with Bonferroni correction were subsequently carried out for each dependent variable. For each ASD behaviour, I examined whether the experimental and control groups showed the same pattern of perceived deception and credibility ratings when the behaviour was present (target condition) versus absent (control condition).

Assumptions testing. Prior to the analysis, the data were screened for outliers and deviations from normality by examining standard scores and values of skewness and kurtosis, respectively. Each variable was examined separately by experimental group and condition of ASD behaviour. This resulted in the removal of one univariate outlier from perceived competence (z = -3.34).[6] Perceived deception was also found to be negatively skewed (see Appendix F). To improve the negative skew, a reflected logarithmic transformation was applied to perceived deception. Upon transformation, values of skewness and kurtosis for all variables were within normal limits. Using Mahalanobis distance with a criterion of $\alpha = .001$, two multivariate outliers were detected from perceived character, and these outliers were also deleted.[7]

Perceived deception. Using Wilks' criterion, the profiles deviated significantly from parallelism, $F(6, 154) = 3.79$, $p = .001$, $\eta_p^2 = .13$, 90% CI [.03, .18] (see Figure 2). As shown in Table 5, interaction contrast analyses revealed that the target individuals were perceived to be significantly more deceptive when they displayed gaze aversion or repetitive body

[6] The results did not differ when this outlier was included in the analysis.
[7] When these outliers were included in the analysis, poor reciprocity was found to have a statistically significant effect on ratings of perceived character, $F(1, 159) = 7.29$, $p = .02$, $\eta_p^2 = .04$, 90% CI [.01, .11] (cf. Table 6).

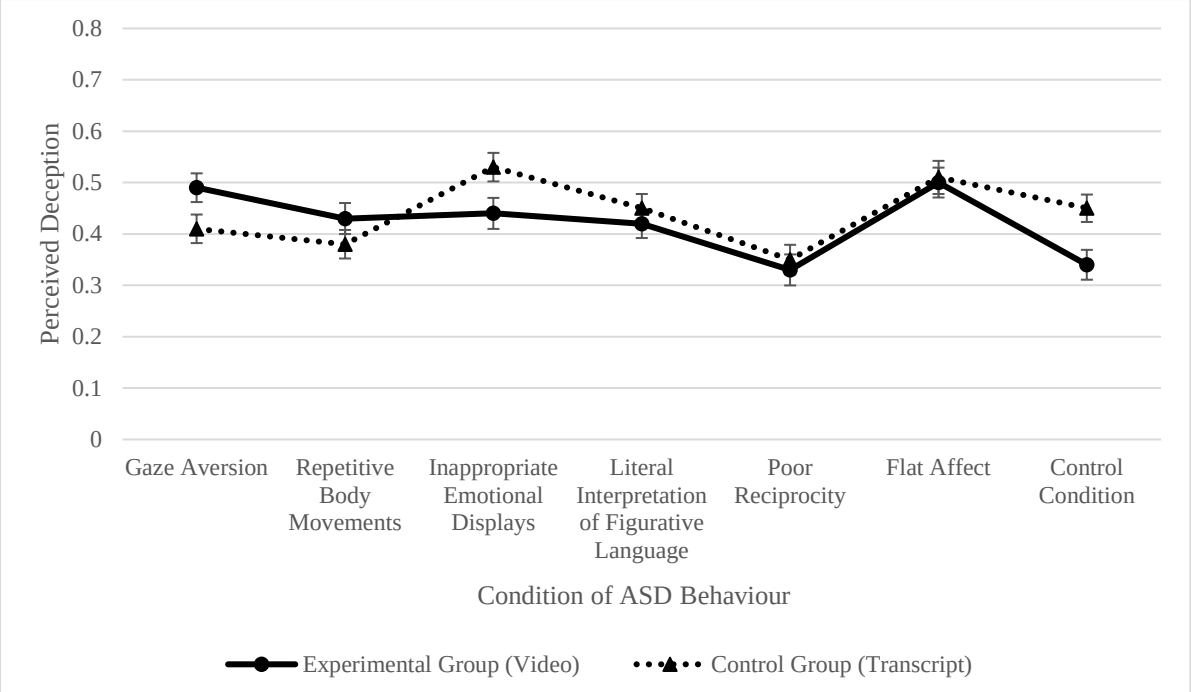

Figure 2. Mean ratings of perceived deception after reflected logarithmic transformation[8] (range 0.00–0.85).

Table 5

Interaction Contrast Analyses for Perceived Deception

Condition of ASD Behaviour	Perceived Deception			
	F	df_1	df_2	η_p^2 [90% CI]
Gaze Aversion	14.58***	1	159	.08 [.03, .16]
Repetitive Body Movements	11.50**	1	159	.07 [.02, .14]
Inappropriate Emotional Displays	0.12	1	159	.001 [.00, .02]
Literal Interpretation of Figurative Language	2.74	1	159	.02 [.00, .06]
Poor Reciprocity	2.77	1	159	.02 [.00, .06]
Flat Affect	3.58	1	159	.02 [.00, .07]

**$p \leq .01$, ***$p \leq .001$

[8] Higher scores indicate higher levels of perceived deception.

movements compared to when they did not display any ASD behaviour. None of the other ASD behaviours affected ratings of perceived deception.

Perceived credibility. As shown in Figures 3 to 5, the profiles deviated significantly[9] from parallelism for ratings of perceived competence [$F(6, 153) = 3.11$, $p = .02$, $\eta_p^2 = .11$, 90% CI = .02, .16], caring [$F(6, 154) = 5.17$, $p < .001$, $\eta_p^2 = .17$, 90% CI = .06, .23], and character [$F(6, 152) = 4.18$, $p = .002$, $\eta_p^2 = .14$, 90% CI = .04, .20]. When the target individuals displayed gaze aversion or repetitive body movements, they were rated significantly lower on perceived competence, caring, and character, compared to when they did not display any ASD behaviour. They were also perceived to be less competent and less caring when they displayed flat affect. Inappropriate emotional displays, literal interpretation of figurative language, and poor reciprocity did not affect ratings on any of the domains of perceived credibility (see Table 6).

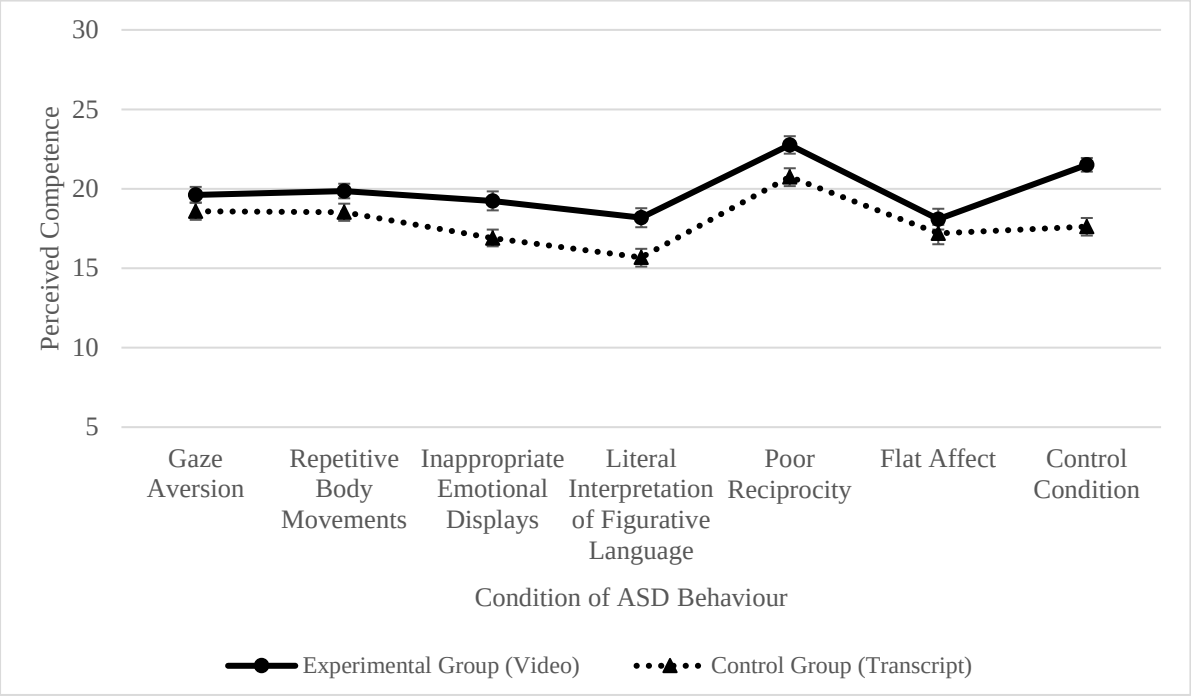

Figure 3. Mean ratings of perceived competence (range 5–30).

[9] Bonferroni correction was applied to the analyses of the three domains of perceived credibility.

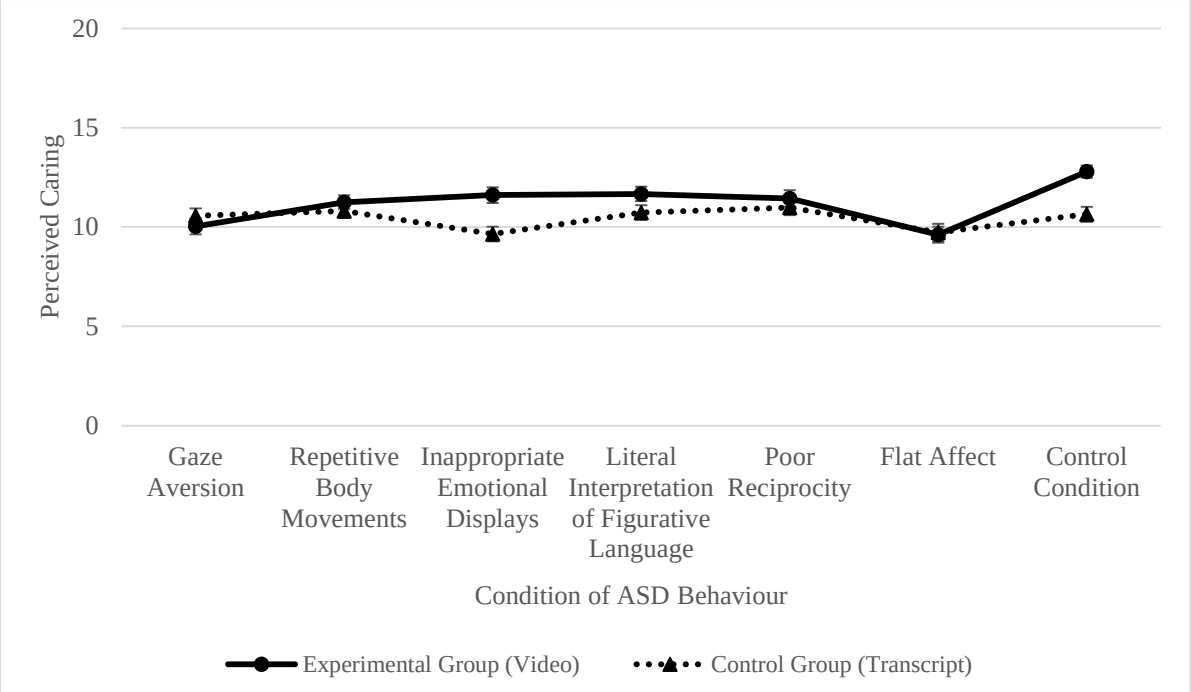

Figure 4. Mean ratings of perceived caring (range 3–18).

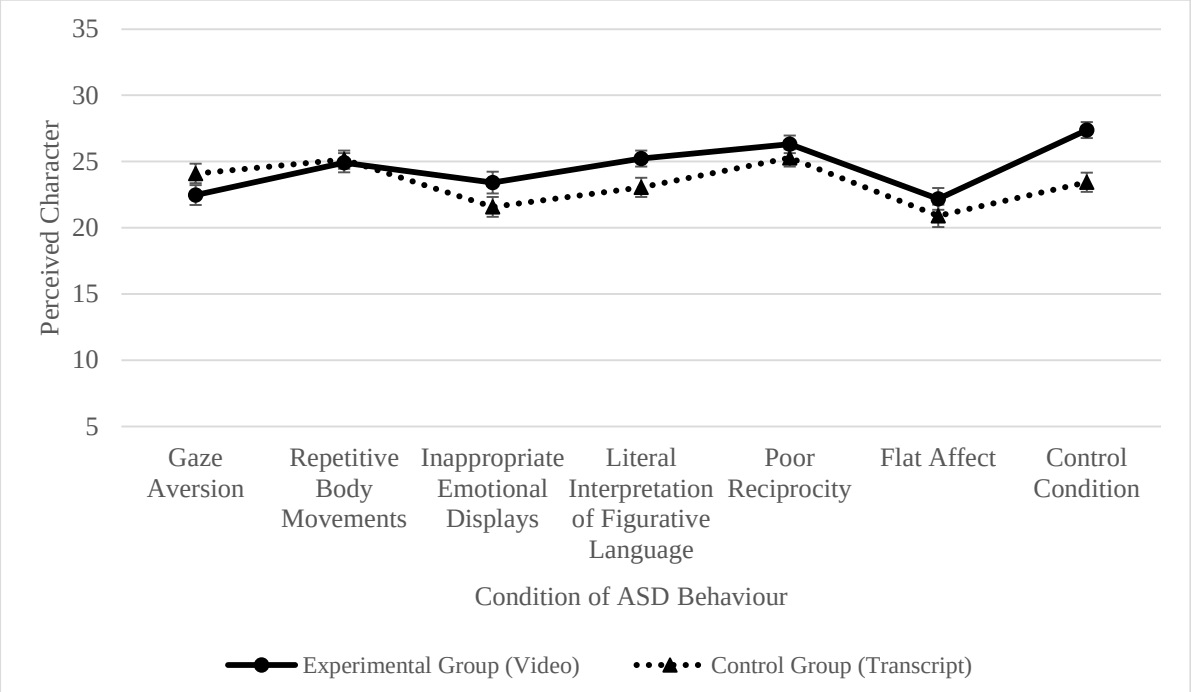

Figure 5. Mean ratings of perceived character (range 6–36).

Table 6

Interaction Contrast Analyses for Perceived Competence, Caring, and Character

Condition of ASD Behaviour	Perceived Competence				Perceived Caring				Perceived Character			
	F	df_1	df_2	η_p^2 [90% CI]	*F*	df_1	df_2	η_p^2 [90% CI]	*F*	df_1	df_2	η_p^2 [90% CI]
Gaze Aversion	11.91**	1	158	.07 [.02, .14]	20.64***	1	159	.11 [.05, .19]	21.13***	1	157	.12 [.05, .20]
Repetitive Body Movements	9.46*	1	158	.06 [.01, .12]	8.62*	1	159	.05 [.01, .12]	13.80**	1	157	.08 [.03, .15]
Inappropriate Emotional Displays	2.65	1	158	.02 [0, .06]	0.09	1	159	.001 [0, .02]	2.46	1	157	.02 [0, .06]
Literal Interpretation of Figurative Language	1.77	1	158	.01 [0, .05]	3.92	1	159	.02 [< .001, .08]	2.25	1	157	.01 [0, .06]
Poor Reciprocity	3.18	1	158	.02 [0, .07]	6.48	1	159	.04 [.005, .10]	6.02	1	157	.04 [.004, .10]
Flat Affect	7.77*	1	158	.05 [.01, .11]	9.14*	1	159	.05 [.01, .12]	3.70	1	157	.02 [0, .07]

*$p \leq .05$, **$p \leq .01$, ***$p \leq .001$

Presentation Order

As studies have shown that judgments of deception are influenced by perceptions of credibility (George et al., 2014; O'Sullivan, 2003), the order in which participants were asked to provide their ratings of perceived deception and credibility was counterbalanced. To examine potential carry-over effects, all analyses were repeated separately by order of presentation of the deception and credibility measures.

Perceived deception.[10]

Presentation order: Deception – Credibility. The profiles deviated significantly from parallelism, $F(6, 87) = 2.88$, $p = .01$, $\eta_p^2 = .17$, 90% CI [.02, .23] (see Figure 6). The target individuals were perceived as significantly more deceptive when they displayed repetitive body movements compared to when they did not display any ASD behaviour. None of the other ASD behaviours affected ratings of perceived deception (see Table 7).

Presentation order: Credibility – Deception. The profiles deviated significantly from parallelism, $F(6, 60) = 2.86$, $p = .02$, $\eta_p^2 = .22$, 90% CI [.02, .30] (see Figure 7). The target individuals were perceived as significantly more deceptive when they displayed gaze aversion compared to when they did not display any ASD behaviour. None of the other ASD behaviours affected ratings of perceived deception (see Table 7).

[10] Perceived deception was found to be negatively skewed. To improve the negative skew, a reflected logarithmic transformation was applied (see Appendix F).

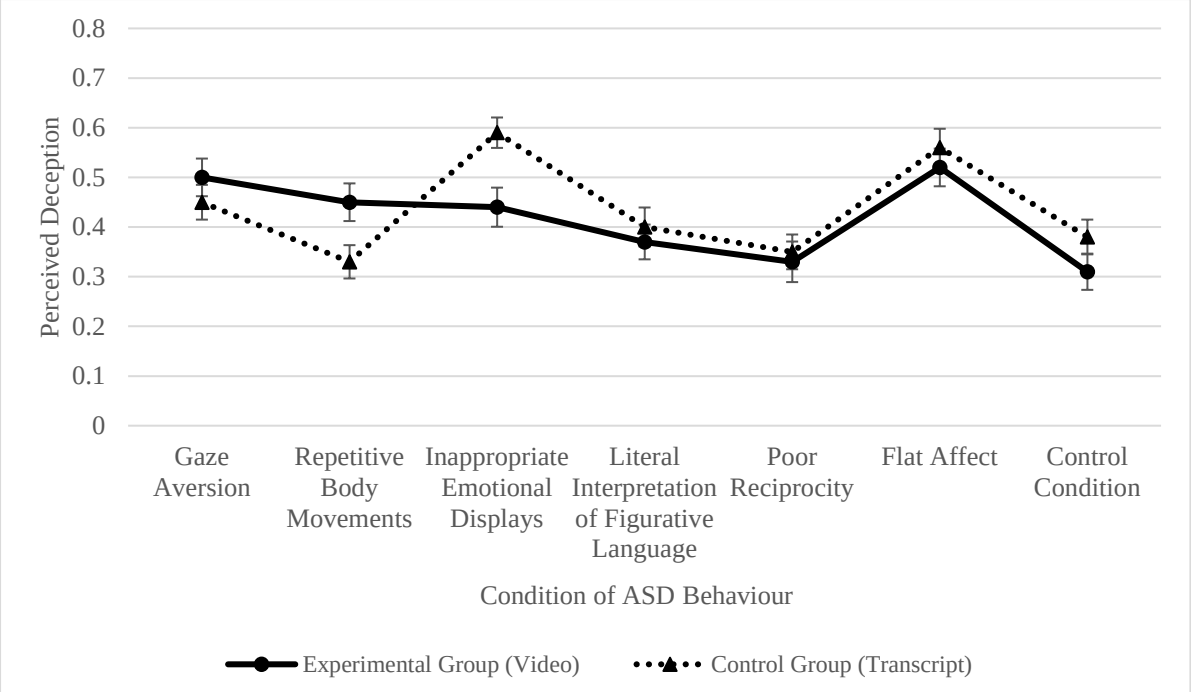

Figure 6. Mean ratings of perceived deception after reflected logarithmic transformation[11] (range 0.00–0.85) for participants who were presented deception measures first.

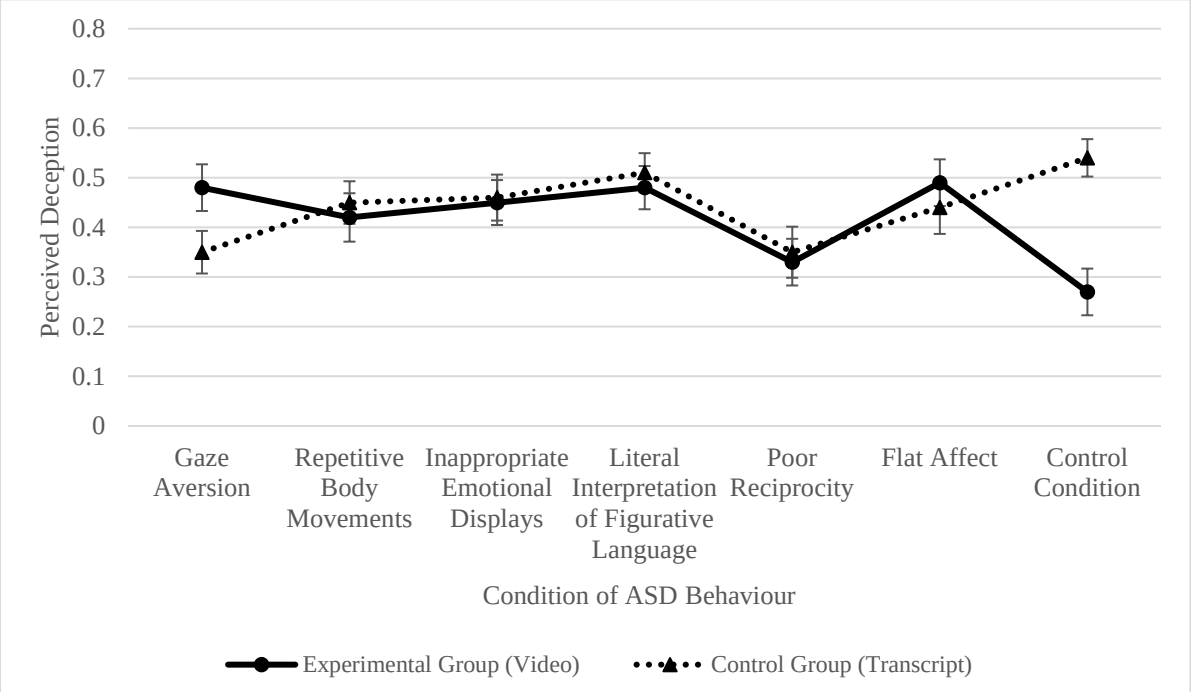

Figure 7. Mean ratings of perceived deception after reflected logarithmic transformation[11] (range 0.00–0.85) for participants who were presented credibility measures first.

[11] Higher scores indicate higher levels of perceived deception.

Table 7

Interaction Contrast Analyses for Perceived Deception by Presentation Order

Condition of ASD Behaviour	Deception – Credibility				Credibility – Deception			
	F	df_1	df_2	η_p^2 [90% CI]	*F*	df_1	df_2	η_p^2 [90% CI]
Gaze Aversion	3.49	1	92	.04 [0, .12]	14.94**	1	65	.19 [.06, .32]
Repetitive Body Movements	8.65*	1	92	.09 [.02, .18]	3.06	1	65	.04 [0, .15]
Inappropriate Emotional Displays	1.37	1	92	.01 [0, .08]	3.74	1	65	.05 [0, .16]
Literal Interpretation of Figurative Language	0.32	1	92	.003 [0, .05]	3.76	1	65	.05 [0, .16]
Poor Reciprocity	0.44	1	92	.005 [0, .05]	3.01	1	65	.04 [0, .15]
Flat Affect	0.07	1	92	.001 [0, .03]	6.78	1	65	.09 [.01, .21]

*$p \leq .05$, **$p \leq .01$

Perceived credibility.[12] The findings of the analyses are illustrated in Figures 8 to 13.

Presentation order: Deception – Credibility. The profiles deviated significantly from parallelism for ratings of perceived competence[13] [$F(6, 87) = 3.45$, $p = .01$, $\eta_p^2 = .19$, 90% CI = .04, .26], caring [$F(6, 87) = 3.35$, $p = .02$, $\eta_p^2 = .19$, 90% CI = .04, .26], and character[14] [$F(6, 86) = 2.96$, $p = .03$, $\eta_p^2 = .17$, 90% CI = .02, .24]. The target individuals were rated significantly lower on perceived competence, caring, and character when they displayed repetitive body movements compared to when they did not display any ASD behaviour. However, none of the other ASD behaviours had a significant effect on any of the domains of credibility (see Table 8).

[12] For each presentation order, Bonferroni correction was applied to the analyses of the three domains of perceived credibility.
[13] Perceived competence was found to be negatively skewed and leptokurtic. To improve the negative skew, a reflected square root transformation was applied (see Appendix F).
[14] One univariate outlier was detected for perceived character ($z = -3.40$), and this outlier was excluded from the analysis. The results did not differ when this outlier was included in the analysis.

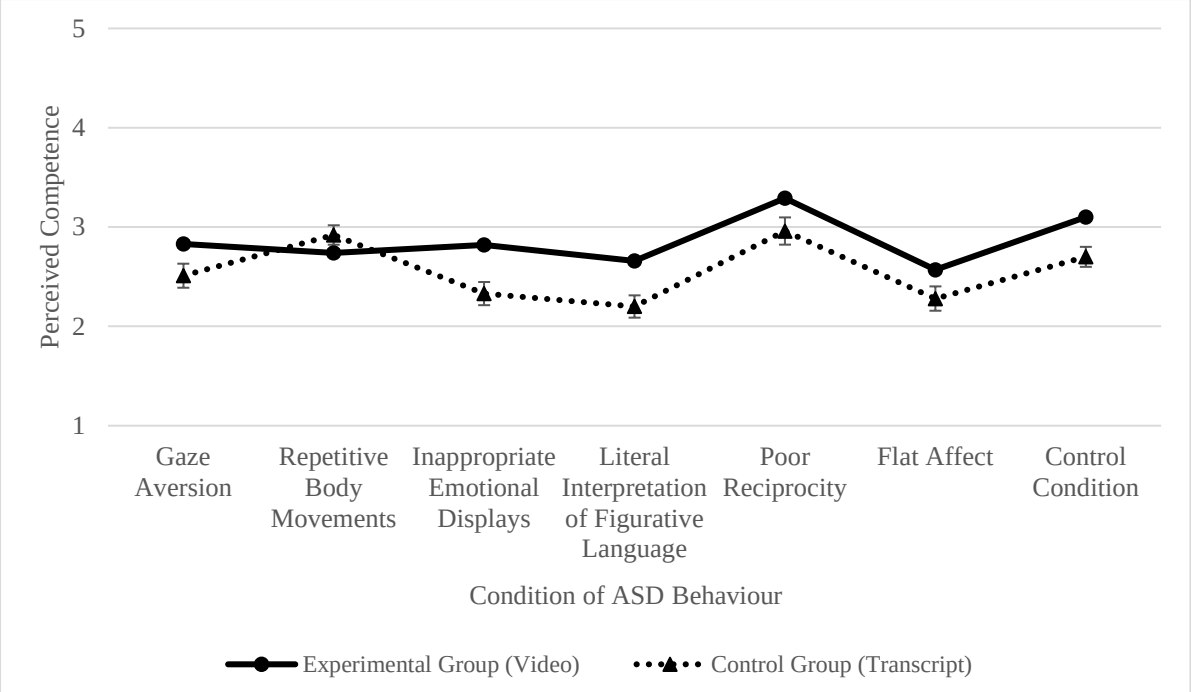

Figure 8. Mean ratings of perceived competence after reflected square root transformation[15] (range 1.0–5.1) for participants who were presented deception measures first.

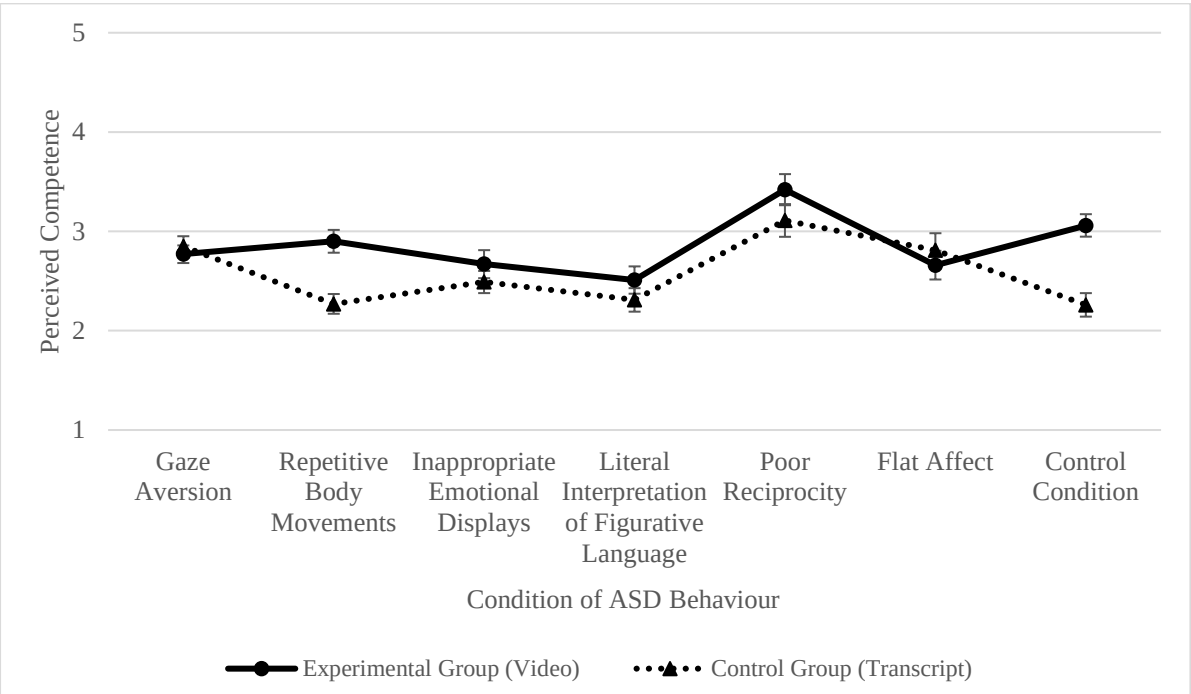

Figure 9. Mean ratings of perceived competence after reflected square root transformation[15] (range 1.0–5.1) for participants who were presented credibility measures first.

[15] For ease of viewing, the graphs have been inverted such that higher scores indicate higher levels of perceived competence.

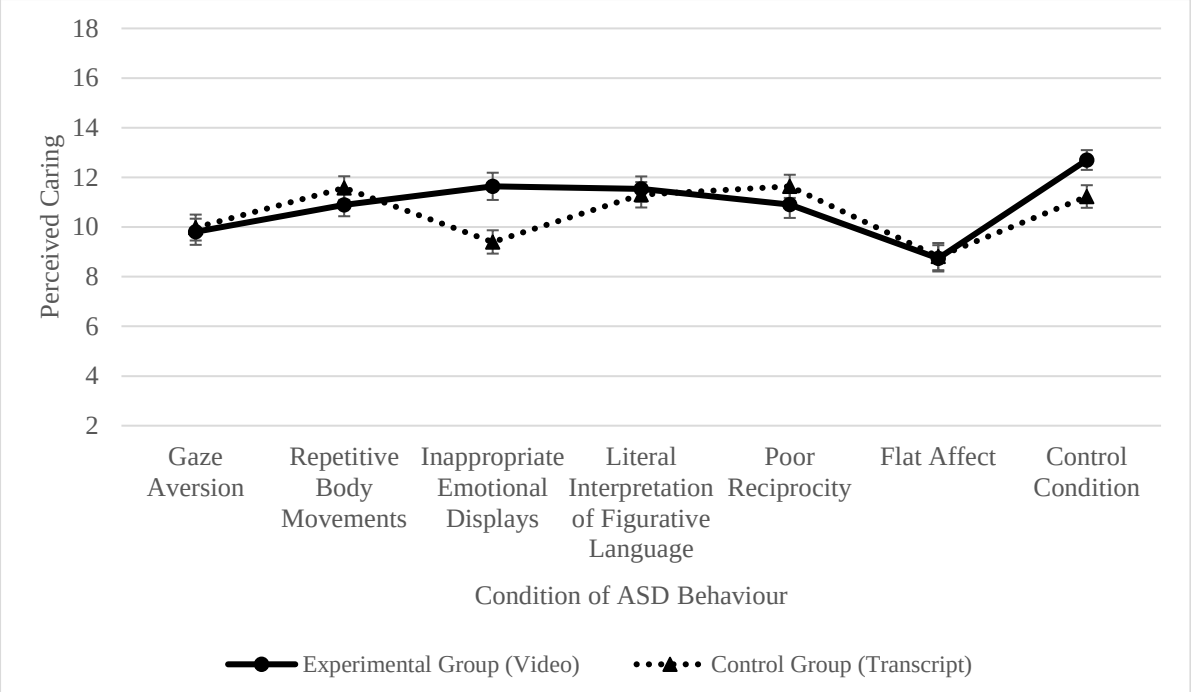

Figure 10. Mean ratings of perceived caring (range 3–18) for participants who were presented deception measures first.

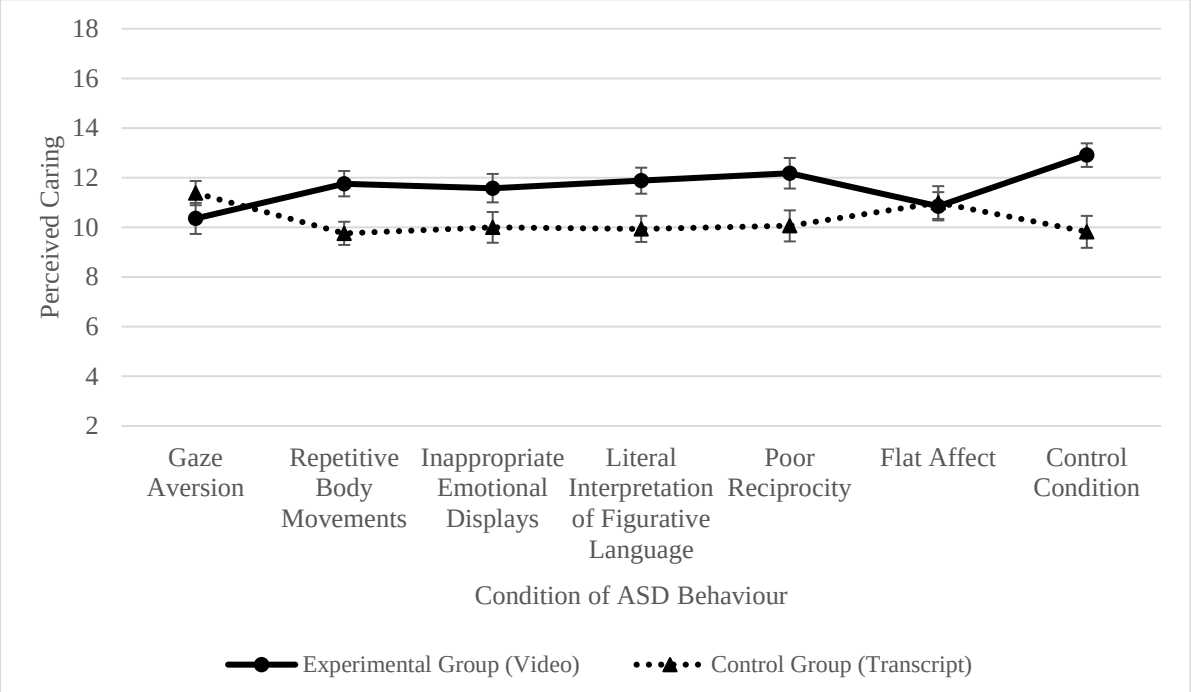

Figure 11. Mean ratings of perceived caring (range 3–18) for participants who were presented credibility measures first.

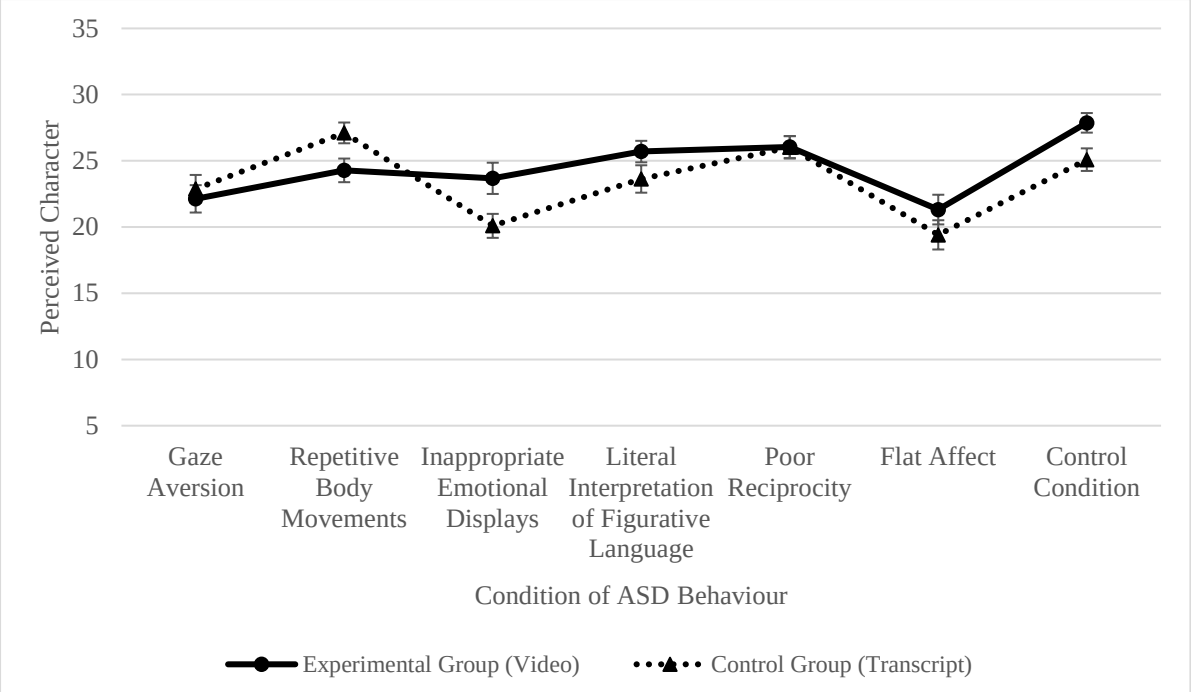

Figure 12. Mean ratings of perceived character (range 6–36) for participants who were presented deception measures first.

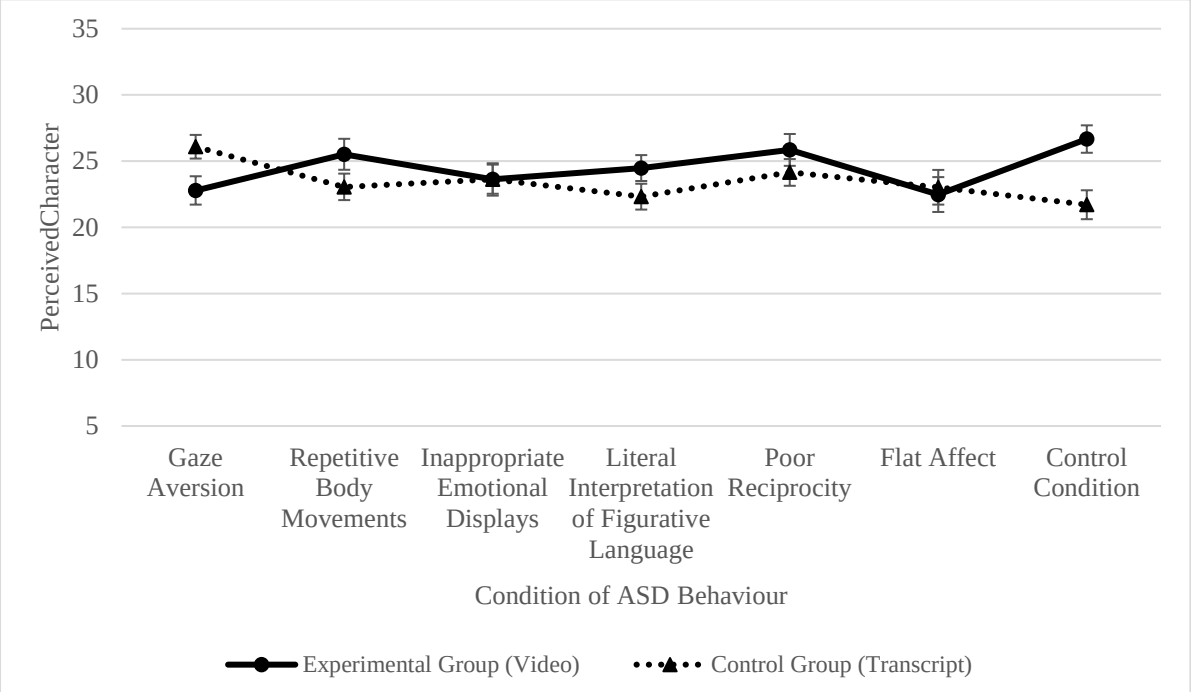

Figure 13. Mean ratings of perceived character (range 6–36) for participants who were presented credibility measures first.

Table 8

Interaction Contrast Analyses for Perceived Competence, Caring, and Character by Presentation Order

Presentation Order	Condition of ASD Behaviour	Perceived Competence				Perceived Caring				Perceived Character			
		F	df_1	df_2	η_p^2 [90% CI]	*F*	df_1	df_2	η_p^2 [90% CI]	*F*	df_1	df_2	η_p^2 [90% CI]
Deception – Credibility	Gaze Aversion	0.20	1	92	.002 [0, .04]	4.73	1	92	.05 [.002, .14]	5.12	1	91	.05 [.003, .14]
	Repetitive Body Movements	13.43**	1	92	.13 [.04, .23]	8.41*	1	92	.08 [.02, .18]	15.66***	1	91	.15 [.05, .26]
	Inappropriate Emotional Displays	0.28	1	92	.003 [0, .05]	1.07	1	92	.01 [0, .07]	0.24	1	91	.003 [0, .04]
	Literal Interpretation of Figurative Language	0.10	1	92	.001 [0, .03]	2.19	1	92	.02 [0, .09]	0.18	1	91	.002 [0, .04]
	Poor Reciprocity	0.11	1	92	.001 [0, .04]	6.35	1	92	.06 [.01, .16]	3.86	1	91	.04 [0, .12]
	Flat Affect	0.31	1	92	.003 [0, .05]	2.74	1	92	.03 [0, .10]	0.26	1	91	.003 [0, .05]
Credibility – Deception	Gaze Aversion	28.63***	1	65	.31 [.16, .43]	21.97***	1	65	.25 [.11, .38]	24.31***	1	65	.27 [.13, .40]
	Repetitive Body Movements	0.79	1	65	.01 [0, .09]	1.34	1	65	.02 [0, .11]	1.78	1	65	.03 [0, .12]
	Inappropriate Emotional Displays	8.51*	1	65	.12 [.02, .24]	2.15	1	65	.03 [0, .13]	6.09	1	65	.09 [.01, .20]
	Literal Interpretation of Figurative Language	7.59*	1	65	.10 [.02, .23]	1.70	1	65	.03 [0, .12]	2.64	1	65	.04 [0, .14]
	Poor Reciprocity	3.14	1	65	.05 [0, .15]	0.88	1	65	.01 [0, .09]	2.51	1	65	.04 [0, .14]
	Flat Affect	14.67**	1	65	.18 [.06, .32]	8.14*	1	65	.11 [.02, .24]	6.30	1	65	.09 [.01, .21]

*$p \leq .05$, **$p \leq .01$, ***$p \leq .001$

Presentation order: Credibility – Deception. The profiles deviated significantly from parallelism for ratings of perceived competence [$F(6, 60) = 6.69$, $p < .001$, $\eta_p^2 = .40$, 90% CI = .18, .48], caring [$F(6, 60) = 4.43$, $p = .003$, $\eta_p^2 = .31$, 90% CI = .09, .39], and character [$F(6, 60) = 4.35$, $p = .003$, $\eta_p^2 = .30$, 90% CI = .09, .39]. The target individuals were rated significantly lower on perceived competence, caring, and character when they displayed gaze aversion compared to when they did not display any ASD behaviour. The presence of flat affect also led to lower ratings of perceived competence and caring, but did not have any significant effect on ratings of perceived character. In addition, perceived competence was also influenced by inappropriate emotional displays and literal interpretation of figurative language. Repetitive body movements and poor reciprocity did not affect any of the domains of credibility (see Table 8).

Discussion

The purpose of this experiment was to investigate the effect of ASD behaviours on judgments of deception and credibility. It was hypothesised that when individuals display an ASD behaviour, specifically gaze aversion, repetitive body movements, inappropriate emotional displays, literal interpretation of figurative language, poor reciprocity, or flat affect, they would be perceived as more deceptive and less credible than when they do not display such behaviours. Overall, the results revealed that there was a significant effect of gaze aversion and repetitive body movements on perceived deception and credibility: the target individuals were rated higher on perceived deception and lower on perceived competence, caring, and character when they displayed gaze aversion or repetitive body movements than when they did not display any ASD behaviour. There was also a significant effect of flat affect on the specific credibility dimensions of competence and caring, with individuals being rated as less competent and less caring when they displayed flat affect compared to when they did not. However, there was no significant effect of inappropriate

emotional displays, literal interpretation of figurative language, or poor reciprocity on judgments of deception or credibility.

Presentation Order

Research has shown that perceived credibility is a significant determinant of perceived deception (George et al., 2014; O'Sullivan, 2003). O'Sullivan (2003) described the existence of the fundamental attribution error in deception detection, whereby people tend to overestimate the importance of dispositional traits of an individual and underestimate the importance of situational factors. This form of the fundamental attribution error results in the inability to distinguish between trait truthfulness (i.e., credibility) and state truthfulness (i.e., veracity), as individuals tend to assume that people who are trustworthy always tell the truth and people who are untrustworthy are always deceptive. Therefore, given that judgments of credibility are known to influence judgments of deception, the order of presentation of credibility and deception measures was counterbalanced in the present study. To identify any potential carry-over effects, all analyses were repeated separately for each presentation order.

The results revealed that there was a difference in the effect of ASD behaviours on judgments of deception and credibility between participants who were presented credibility measures first compared to participants who were presented deception measures first. While it was previously noted that gaze aversion and repetitive body movements had significant effects on judgments of deception and credibility, further analyses revealed that the effect of repetitive body movements on perceived deception and credibility only held true when participants were presented deception measures first, and there was no significant effect of repetitive body movements on perceived deception or credibility when credibility measures were presented first. Conversely, gaze aversion only had a significant effect on judgments of deception and credibility when credibility measures were presented first, and there was no significant effect of gaze aversion on perceived deception or credibility when deception

measures were presented first. Similarly, the effect of flat affect on perceived caring was only present when credibility measures were presented first but not when deception measures were presented first.

In addition, analysing the results by presentation order also revealed significant effects of ASD behaviours on judgments of credibility that were not previously identified. When participants were presented credibility measures first, there was a significant effect of inappropriate emotional displays on perceived competence and caring. There was also a significant effect of literal interpretation of figurative language and flat affect on perceived competence. However, none of these effects were present when deception measures were presented first.

One possible explanation for these findings is that gaze aversion affects judgments of credibility but not judgments of deception. When credibility measures are presented first, participants are prompted to form an impression of the target individual's credibility, which is negatively affected by the presence of gaze aversion. According to "the boy-who-cried-wolf effect" described by O'Sullivan (2003), individuals are unable to distinguish between trait and state truthfulness. Thus, once the target individual is labelled as non-credible, participants are likely to perceive the individual as also being untruthful. As a result, although gaze aversion only affects judgments of credibility, presenting credibility measures first causes this effect to be carried over to judgments of deception. In contrast, when deception measures are presented first, gaze aversion has no significant effect on judgments of deception, and thus, the target individual is perceived to be truthful. Once the target individual is deemed to be telling the truth, his general credibility is also assumed. However, to the best of my knowledge, no study thus far has empirically examined the relationship between gaze aversion, perceived deception, and perceived credibility.

In the same way, it is possible that repetitive body movements affect judgments of deception but not judgments of credibility. When deception measures are presented first, participants are prompted to form an impression of whether the target individual is telling the truth, which is negatively affected by the presence of repetitive body movements. Once the target individual is labelled as being deceptive, participants are likely to also perceive the individual as non-credible, as they are unable to recognise the possibility that generally credible people can sometimes be deceptive. Therefore, although repetitive body movements only affect judgments of deception, presenting deception measures first causes this effect to be carried over to judgments of credibility. In contrast, when credibility measures are presented first, repetitive body movements have no significant effect on judgments of credibility. Once the target individual is deemed to be credible, it is assumed that he is also telling the truth.

However, this explanation then begs the question – why are the effects of inappropriate emotional displays, literal interpretation of figurative language, and flat affect on perceived competence and caring not carried over to judgments of deception? Perhaps more specifically, it is the effects on perceived *character* (rather than credibility as a whole) that are carried over to judgments of deception. The findings of the present experiment are insufficient to test this hypothesis, and thus, further research is warranted.

It is important to note that regardless of the presentation order of the measures, we cannot be certain which judgment was actually formed first by the participants, and therefore, the interpretation of these results is speculative at best. Furthermore, the fact that the findings of the experiment differed according to the presentation order of the measures also raises the possibility that the significant results obtained in the present experiment are fragile, and as a result, no reliable conclusions can be drawn from the current paradigm regarding the effect of ASD behaviours on judgments of deception and credibility.

Limitations

For each condition of ASD behaviour, interview questions were selected such that they provided a suitable context for the demonstration of the target behaviour. However, as a result, the verbal content of the interviews varied according to the specific interview questions asked in each condition. In an attempt to account for these differences, a control group was added, in which participants were asked to read transcripts of the interviews and to indicate their impression of the target individual's truthfulness and credibility based on these transcripts. The ratings of the control group were then used as the baseline from which the ratings of deception and credibility of the experimental group (who viewed the stimulus videos) were compared. While this approach was useful in identifying differences in perceptions of deception and credibility that were due to the presence of nonverbal ASD behaviours, the demonstration of literal interpretation of figurative language and poor reciprocity were, by definition, linked to the individuals' verbal responses. Thus, although the transcripts may not have captured the full depth of these behaviours, they would inevitably still have conveyed them to some degree. It should not come as a surprise, then, that no significant interaction effects of ASD behaviour and experimental group were found for these two conditions.

Therefore, to examine whether ratings of perceived deception and credibility differed between these conditions and the control condition (irrespective of whether participants viewed videos or read transcripts of the interviews), paired-samples *t* tests with Bonferroni correction were conducted. There were no differences in ratings of perceived deception, caring, or character between the literal interpretation of figurative language condition and control condition, and between the poor reciprocity condition and control condition. However, there were significant differences in ratings of perceived competence: individuals were perceived to be significantly less competent when they displayed literal interpretation of

figurative language than when they did not [$t(159) = -5.02$, $p < .001$, $d = 0.38$, 95% CI = 0.16, 0.60], but were perceived to be significantly *more* competent when they displayed poor reciprocity compared to when they did not [$t(159) = 4.15$, $p < .001$, $d = 0.32$, 95% CI = 0.10, 0.54].

Although these findings indicate that there may be effects of literal interpretation of figurative language and poor reciprocity on perceived competence, it remains uncertain whether these differences that were detected were actually due to the presence of the target behaviours or if they were simply due to the variation in interview questions between conditions. Therefore, in order to obtain a clearer understanding of the effect of ASD behaviours on perceived deception and credibility, Experiment 2 was conducted to improve upon the methodological limitations of Experiment 1: (1) to prevent presentation order from being a confounding variable, only one measure of deception or credibility was presented to each participant, and (2) to reduce the variability between stimulus videos for each condition, only one set of interview questions was used for all videos and the individuals involved were instructed to provide standardised answers in response to each question.

EXPERIMENT 2

Similar to Experiment 1, Experiment 2 tested the hypothesis that individuals who display gaze aversion, repetitive body movements, inappropriate emotional displays, literal interpretation of figurative language, poor reciprocity, or flat affect would be perceived as more deceptive and less credible than individuals who do not display these behaviours.

Stimulus Development

Six amateur actors (3 female) aged between 21 and 58 ($M = 32.33$, $SD = 13.37$, $Mdn = 28.50$) years were involved in the production of stimulus videos for use in this experiment. Four were university students and none had any professional acting experience. Each actor was filmed participating an interview in which they were asked four questions about their

high school experience: “Where did you go to high school?” “What did you like most about school?” “What did you like least about school?” and “When you were at school, would you describe yourself as the class clown?” The same interview was conducted seven times for each actor (for a total of 42 videos), and each time, the actors were instructed to display one of the seven conditions of ASD behaviour (see Table 9). In all the videos, the actor was seated facing the camera, with only their upper body in the camera frame. The interviewer was seated behind the camera and therefore, was not visible in the videos.

To reduce variability caused by spontaneous responses, all actors were provided with a standardised script of how they should respond to the interview questions. The same script was used across all conditions of ASD behaviour, with the exception of the literal interpretation of figurative language condition, in which the script required actors to respond to questions literally rather than figuratively (see Appendix G). Finally, a still frame of an elephant was displayed for three seconds at the end of the video as part of an attention check. Each video was approximately two minutes long.

Preliminary Study

Prior to Experiment 2, a manipulation check was first conducted to ensure that the stimulus videos successfully captured the intended ASD behaviours.

Participants

A priori sample size estimations using G*Power 3.1 (Faul et al., 2007) suggested that a minimum sample size of 225 participants would be required to detect a medium effect (f = .25) at an alpha level of .05 and power of .80 in a one-way independent ANOVA with seven conditions. Haphazard sampling was used to recruit a total of 211 participants via the online crowdsourcing platform TurkPrime (Litman et al., 2017). However, of these, the data from 31 participants were excluded from the analysis (30 participants failed to pass attention checks and one participant experienced technical difficulties). The final sample consisted of 180

Table 9

Operationalisations of Conditions of ASD Behaviour (Experiment 2)

Condition of ASD Behaviour	Operationalisation
Gaze Aversion	The individual gazed downward or to either side throughout the interview.
Repetitive Body Movements	The individual demonstrated repetitive body movements throughout the interview (e.g., fidgeting, hand-wringing).
Inappropriate Emotional Displays	The individual acted sad when talking about what he/she liked about school and acted happy when talking about what he/she disliked about school.
Literal Interpretation of Figurative Language	The individual interpreted the interviewer's questions literally. When asked what he/she liked and disliked about school, the individual responded with regard to the school building. The individual also interpreted the metaphor "class clown" literally.
Poor Reciprocity	Only the interviewer's first question was presented in the video, with subsequent questions edited out such that the individual appeared to talk continuously without regard for the interviewer.
Flat Affect	The individual did not exhibit any (or limited) facial expression or vocal intonation throughout the interview.
Control Condition	The individual was not instructed to display any particular nonverbal behaviour.

participants (66 female) ranging in age from 18 to 74 years (M = 34.71, SD = 10.13, Mdn = 32.10). One hundred and sixty-four participants spoke English as their first language, and 54 participants were fluent in more than one language.

Materials

Stimulus materials. The 42 videos that were developed were used as stimulus materials, with each video depicting one of the seven conditions of ASD behaviour (see Table 9).

Gaze aversion. To better capture the varying degrees to which each ASD behaviour was displayed by the actors in the videos, the behaviours were measured on a continuous scale, as opposed to the categorical measure employed in Experiment 1. Gaze aversion was measured with a single question, "To what extent did the individual avoid eye contact with the interviewer?" Participants provided their response on a 6-point Likert scale ranging from 1 (*not at all*) to 6 (*very much*). Ratings of the other five ASD behaviours were recorded on the same scale, with reverse scoring used for inappropriate emotional displays, poor reciprocity, and flat affect.

Repetitive body movements. Repetitive body movements were measured with a single question, "To what extent did the individual fidget during the interview?"

Inappropriate emotional displays. Inappropriate emotional displays were measured with a single question, "To what extent were the individual's emotional reactions appropriate for the topic of conversation?"

Literal interpretation of figurative language. Literal interpretation of figurative language was measured with a single question, "To what extent did the individual interpret figurative language (e.g., metaphors) inaccurately?"

Poor reciprocity. Poor reciprocity was measured with a single question, "To what extent did the individual take turns to talk with the interviewer?"

Flat affect. Flat affect was measured with a single question, "To what extent was the individual emotionally expressive?"

Attention checks. Two attention checks were included in a demographic questionnaire that was administered prior to the study. In the first attention check, participants were asked to, "Please select the second option from the top (i.e., option '3 – 4')" from a list of six options. In the second attention check, participants were asked to, "Please spell the word 'WORLD' backwards (no spaces or punctuation)." A third attention check was presented at the end of the study, in which participants were asked to identify the animal that was shown in the video from a list of five options. It was determined a priori that data from participants who failed to pass any of these three attention checks would be excluded from the analysis.

Procedure

The study was presented through an online survey platform (Qualtrics, Provo, UT). Participants first provided demographic information and were presented with two attention checks. Each participant was then shown one of the 42 stimulus videos and asked to rate the extent to which each of the target ASD behaviours was displayed by the individual in the video. Finally, participants were presented with the third attention check and given the opportunity to indicate if they had experienced any technical difficulties during the study.

Results

The participants' ratings were grouped according to condition of ASD behaviour into a total of seven groups: gaze aversion, repetitive body movements, inappropriate emotional displays, literal interpretation of figurative language, poor reciprocity, flat affect, and control condition (i.e., no ASD behaviour displayed). To examine whether the actors' portrayal of each ASD behaviour was noticed by participants watching the stimulus videos, six independent one-way ANOVAs with Bonferroni correction[16] were conducted, with ASD

[16] As the overall multivariate effect was not of interest, six independent one-way ANOVAs with Bonferroni correction were used instead of an independent one-way MANOVA.

behaviour as the independent variable, and ratings of perceived gaze aversion, repetitive body movements, inappropriate emotional displays, literal interpretation of figurative language, poor reciprocity, and flat affect as the dependent variables, respectively.

There was a significant difference between the seven conditions in ratings of perceived gaze aversion [$F(6, 173) = 13.75$, $p < .001$, $\eta_p^2 = .32$, 90% CI = .21, .39], repetitive body movements [$F(6, 173) = 4.06$, $p = .01$, $\eta_p^2 = .12$, 90% CI = .03, .18], literal interpretation of figurative language [$F(6, 173) = 5.83$, $p < .001$, $\eta_p^2 = .17$, 90% CI = .07, .23], poor reciprocity[17] [$F(6, 173) = 17.35$, $p < .001$, $\eta_p^2 = .38$, 90% CI = .26, .44], and flat affect [Welch's $F(6, 73.57) = 5.94$, $p < .001$, est. $\omega^2 = .14$]. For each behaviour, multiple comparisons[18] were then carried out to examine whether the actors were rated as demonstrating significantly higher levels of the target behaviour for videos in the respective condition compared to videos in each of the other six conditions. A summary of these findings is shown in Table 10.

The target individuals were rated as demonstrating significantly greater gaze aversion, repetitive body movements, literal interpretation of figurative language, and poor reciprocity for videos in the respective condition compared to videos in all other conditions. However, there was no significant difference in ratings of perceived flat affect between videos in the flat affect condition and videos in the gaze aversion, literal interpretation of figurative language, or poor reciprocity conditions (see Table 10).

[17] The assumption of normality was violated for ratings of perceived poor reciprocity in Condition 1 (Gaze Aversion), with a standardised skewness value of 3.41. To improve the positive skew, a square root transformation was applied (see Appendix H).

[18] Dunnett's test was used to examine ratings of perceived gaze aversion, repetitive body movements, literal interpretation of figurative language, and poor reciprocity. However, as Levene's test revealed that the assumption of equality of error variances was violated for ratings of perceived flat affect [$F(6, 173) = 2.53$, $p = .02$], orthogonal contrasts with Bonferroni correction were carried out instead of Dunnett's test for this variable.

Table 10

Differences in Level of Perceived ASD Behaviour between the Target Condition and All Other Conditions (Experiment 2)

Condition	Perceived Gaze Aversion		Perceived Body Movements		Perceived Inappropriate Emotion		Perceived Literal Interpretation		Perceived Poor Reciprocity		Perceived Flat Affect	
	$\mu_1 - \mu_2$	*d* [95% CI]	$\mu_1 - \mu_2$	*d* [95% CI]	$\mu_1 - \mu_2$	*d* [95% CI]	$\mu_1 - \mu_2$	*d* [95% CI]	$\mu_1 - \mu_2$	*d* [95% CI]	$\mu_1 - \mu_2$	*d* [95% CI]
(1)	-	-	1.66***	1.12 [0.50, 1.74]	-0.04	-0.20 [-0.75, 0.35]	2.12***	1.48 [0.87, 2.08]	0.68***	1.84 [1.24, 2.43]	0.13	0.08 [-0.42, 0.58]
(2)	2.43***	2.15 [1.43, 2.86]	-	-	0.03	0.13 [-0.50, 0.76]	2.04***	1.41 [0.72, 2.10]	0.72***	2.06 [1.35, 2.78]	1.39**	0.99 [0.37, 1.61]
(3)	2.20***	1.87 [1.21, 2.52]	1.56***	1.17 [0.49, 1.85]	-	-	2.18***	1.40 [0.74, 2.06]	0.71***	1.84 [1.17, 2.50]	1.43***	1.08 [0.48, 1.68]
(4)	2.29***	1.98 [1.33, 2.63]	1.47***	1.26 [0.58, 1.93]	-0.08	-0.37 [-0.97, 0.23]	-	-	0.71***	1.88 [1.23, 2.52]	0.83	0.53 [-0.03, 1.09]
(5)	2.62***	2.00 [1.39, 2.61]	1.71***	1.34 [0.70, 1.99]	0.03	0.15 [-0.41, 0.71]	2.25***	1.53 [0.91, 2.14]	-	-	0.47	0.32 [-0.19, 0.84]
(6)	2.29***	1.80 [1.21, 2.40]	1.91***	1.35 [0.70, 2.00]	-0.11	-0.50 [-1.07, 0.07]	1.96***	1.33 [0.72, 1.93]	0.71***	1.75 [1.15, 2.35]	-	-
(7)	2.49***	2.07 [1.44, 2.70]	1.31***	1.12 [0.48, 1.76]	0.07	0.33 [-0.25, 0.90]	1.76***	1.09 [0.50, 1.69]	0.89***	2.66 [1.95, 3.37]	1.37***	1.04 [0.49, 1.60]

Note. The conditions of ASD behaviour were: (1) gaze aversion, (2) repetitive body movements, (3) inappropriate emotional displays, (4) literal interpretation of figurative language, (5) poor reciprocity, (6) flat affect, and (7) control condition. Each column shows the mean difference in ratings of the specified ASD behaviour between the target condition and each of the other six conditions.

**$p \leq .01$, ***$p \leq .001$

There was no significant difference in ratings of perceived inappropriate emotional displays[19] between the seven conditions, $F(6, 173) = 2.40$, $p = .18$, $\eta_p^2 = .08$, 90% CI [.004, .12] (see Table 10). To examine whether this result was representative of all videos in the inappropriate emotional displays condition, the ratings for each actor in this condition were compared. A one-way independent ANOVA was run with actor as the independent variable and ratings of perceived inappropriate emotional displays as the dependent variable. The results revealed that there was no significant difference in ratings of perceived inappropriate emotional displays between the six actors in the inappropriate emotional displays condition, $F(5, 15) = 1.05$, $p = .43$, $\eta_p^2 = .26$, 90% CI [0, .35]. However, it is important to note that the sample size was small, with a total of only 21 participants in this condition. Upon examination of the means, it was observed that mean ratings of perceived inappropriate emotional displays was lowest for actor "C" (see Table 11).

Table 11

Mean Ratings of Perceived Inappropriate Emotional Displays for Condition 3[20]

Actor	*n*	Perceived Inappropriate Emotional Displays	
		M	*SD*
A	1	0.60	-
B	2	0.39	0.12
C	6	0.18	0.21
D	3	0.42	0.10
E	5	0.36	0.26
F	4	0.30	0.25

[19] The assumption of normality was violated for ratings of perceived inappropriate emotional displays in Condition 2 (Repetitive Body Movements), with a standardised kurtosis value of 3.69. To improve the normality of the distribution, a logarithmic transformation was applied (see Appendix H).

[20] A logarithmic transformation was applied to ratings of perceived inappropriate emotional displays. After transformation, ratings of perceived inappropriate emotional displays in Condition 3 ranged from 0 to .70.

Thus, to examine whether it was solely actor "C" whose portrayal of inappropriate emotional displays was not sufficiently noticeable, the analysis was repeated with the exclusion of actor "C" from the inappropriate emotional displays condition. The results revealed that there was still no significant difference in ratings of perceived inappropriate emotional displays between the seven conditions, $F(6, 167) = 2.58$, $p = .12$, $\eta_p^2 = .08$, 90% CI [.01, .13].

Discussion

In this study, I investigated whether the actors' portrayal of each ASD behaviour was noticed and correctly identified by participants watching the stimulus videos, by examining whether participants' ratings of the target behaviour were significantly higher for videos in the respective condition (i.e., videos in which the target behaviour was intended to be portrayed) compared to videos in all other conditions. When the actors portrayed gaze aversion, repetitive body movements, literal interpretation of figurative language, or poor reciprocity, these behaviours were rated as significantly more noticeable by participants who viewed the respective videos compared to participants who viewed videos in all other conditions. Thus, the manipulation of gaze aversion, repetitive body movements, literal interpretation of figurative language, and poor reciprocity in the proposed stimulus videos was effective.

When the actors intentionally portrayed flat affect (i.e., videos in the flat affect condition), flat affect was rated as significantly more noticeable by participants who viewed these videos compared to participants who viewed videos in the repetitive body movements, inappropriate emotional displays, and control conditions. However, there was no significant difference in level of perceived flat affect between the flat affect condition and the gaze aversion, literal interpretation of figurative language, and poor reciprocity conditions. As such, a significant limitation of the present stimulus videos was that the actors in these

conditions were also rated as demonstrating high levels of flat affect, despite the fact that this behaviour was not intentionally portrayed. Given that the difference in level of perceived flat affect between videos in the flat affect condition and control condition was significant and demonstrated a large effect size ($p < .001$, $d = 1.04$), these stimulus videos were deemed to be adequate for use in Experiment 2; however, the findings of Experiment 2 should be interpreted in light of the aforementioned limitations.

The manipulation of inappropriate emotional displays was unsuccessful, as the actors were perceived to be demonstrating similar levels of inappropriate emotional displays across all conditions. As discussed in Experiment 1, it is possible that incongruent emotional displays are only perceived to be socially inappropriate under certain circumstances. While it would certainly be of value to examine the contexts in which particular emotional displays are deemed to be socially inappropriate and how this then affects judgments of deception and credibility, these research questions were beyond the scope of the present project. Thus, in the interest of maintaining consistent interview questions across all stimulus videos, the inappropriate emotional displays condition was subsequently excluded. Experiment 2 therefore only examined the effects of gaze aversion, repetitive body movements, literal interpretation of figurative language, poor reciprocity, and flat affect on judgments of deception and credibility.

Method

Design

A 6 (ASD Behaviour: gaze aversion, repetitive body movements, literal interpretation of figurative language, poor reciprocity, flat affect, control condition) × 2 (Measure: deception, credibility) between-subjects design was used. The dependent variable for this study was perception of the target individual.

Participants

Haphazard sampling was used to recruit a total of 540 participants via the online crowdsourcing platform TurkPrime (Litman et al., 2017). Of these, 77 participants failed to pass attention checks, and the data from these participants were excluded from the analysis. The final sample consisted of 463 participants (209 female), ranging in age from 18 to 84 years (M = 36.86, SD = 10.81, Mdn = 33.38). Three hundred and ninety-four participants spoke English as their first language, and 141 participants were fluent in more than one language. Table 12 shows the distribution of participants by condition of ASD behaviour and measure completed. A priori sample size estimations using G*Power 3.1 (Faul et al., 2007) suggested that a minimum sample size of 211 participants would be required to detect a medium effect (f = .25) at an alpha level of .05 and power of .80 in a one-way independent ANOVA with six conditions.

Table 12

Number of Participants by Condition and Measure Completed (Experiment 2)

Condition of ASD Behaviour	*n*	
	Perceived Deception	Perceived Credibility
Gaze Aversion	35	43
Repetitive Body Movements	37	37
Literal Interpretation of Figurative Language	43	43
Poor Reciprocity	33	37
Flat Affect	44	37
Control Condition	35	39
Total	227	236

Materials

Stimulus materials. As previously discussed, the 36 videos that demonstrated successful manipulation of ASD behaviour were used as stimulus materials in the present experiment. Each video was approximately two minutes long and depicted an individual portraying one of the six conditions of ASD behaviour (i.e., no ASD behaviour for the control condition) while being interviewed about their high school experience.

Perceived deception. Perceived deception was measured with a single question, "Do you think this person was telling the truth?" Participants provided their response on a 6-point Likert scale ranging from 1 (*deceptive*) to 6 (*truthful*).

Perceived credibility. Perceived credibility was measured using a modified version of the 18-item source credibility measure by McCroskey and Teven (1999), as described in Experiment 1. The order of presentation of the items was randomised for each participant.

Attention checks. The attention checks that were described in the Preliminary Study were again used.

Procedure

This study was presented through an online survey platform (Qualtrics, Provo, UT). To avoid response bias, participants were not informed of the true purpose of the study but were instead told that the study aimed to investigate deception detection abilities. Participants first provided demographic information and were presented with two attention checks. Participants were then shown one of the 36 stimulus videos and asked to indicate their perception of the individual in the video on one of the two measures (deception or credibility). Finally, participants were presented with the third attention check and were given the opportunity to indicate if they had experienced any technical difficulties during the study. Participants were debriefed on the true purpose of the study at the end of the experiment.

Results

Evaluation of Credibility Model Fit

Prior to hypothesis testing, the model fit of McCroskey and Teven's (1999) measure of source credibility was evaluated using the same approach previously described in Experiment 1 (N = 236). The results indicated that the hypothesised three-factor model was once again a poor fit for the data, and thus, respecification of the model was pursued through post hoc adjustments. The adjustments and corresponding indices of fit are summarised in Table 13 and detailed in Appendix E. The resulting best-fit model was identical to the best-fit model obtained in Experiment 1, and therefore, this model was used in all subsequent

Table 13

Goodness-of-Fit Indices for McCroskey and Teven's (1999) Measure of Source Credibility (Experiment 2)

Model	Goodness-of-Fit Measure				
	χ^2	*df*	TLI	CFI	RMSEA
Optimal value [a]	-	-	> .95	> .95	< .06
Hypothesised three-factor model	528.64***	132	.82	.85	.11
Single-factor model	750.74***	135	.73	.76	.14
Respecified Model 2; three-factor model, items Ca3[21], Ca5, and Ca6 deleted	338.70***	87	.87	.89	.11
Respecified Model 3; three-factor model, item Co2 deleted	274.18***	74	.89	.91	.11

Note. TLI = Tucker-Lewis index; CFI = comparison fit index; RMSEA = root mean square error of approximation.
[a] Hu and Bentler (1999)
***$p \leq .001$

[21] Items are labelled by subscale and item number, with Co, Ca, and Ch, indicating items from the Competence, Caring, and Character subscales, respectively.

experiments (see Table 4 for the operationalisations of perceived competence, caring, and character).

Hypothesis Testing

Perceived deception. An independent one-way ANOVA with ASD behaviour as the independent variable and perceived deception as the dependent variable was conducted. There was no significant difference in ratings of perceived deception between the six conditions of ASD behaviour, $F(5, 221) = 0.70$, $p = .62$, $\eta_p^2 = .02$, 90% CI [0, .03] (see Table 14).

Perceived credibility. Three independent one-way ANOVAs with Bonferroni correction were conducted, with ASD behaviour as the independent variable and perceived competence, caring, and character as the dependent variables, respectively. There was a statistically significant effect of ASD behaviour on ratings of perceived caring [$F(5, 230) = 4.41$, $p = .003$, $\eta_p^2 = .09$, 90% CI = .02, .13]. Multiple comparisons using Dunnett's test revealed that when individuals displayed gaze aversion, literal interpretation of figurative language, or flat affect, they were perceived to be less caring than when they did not display any ASD behaviour (see Table 14). However, there was no significant effect of ASD behaviour on ratings of perceived competence[22] [Welch's $F(5, 106.55) = 2.54$, $p = .10$, est. $\omega^2 = .03$] or character [Welch's $F(5, 106.97) = 1.88$, $p = .32$, est. $\omega^2 = .02$].

Discussion

The purpose of this study was to investigate the effect of ASD behaviours on judgments of deception and credibility. It was hypothesised that when individuals display gaze aversion, repetitive body movements, literal interpretation of figurative language, poor reciprocity, or flat affect, they would be perceived as more deceptive and less credible

[22] One outlier was detected for perceived competence ($z = -3.39$), and this outlier was excluded from the analysis. The results did not differ when this outlier was included in the analysis.

Table 14

Differences in Ratings of Perceived Deception and Credibility between the Control Condition and Experimental Conditions (Experiment 2)

	Perceived Deception		Perceived Competence		Perceived Caring		Perceived Character	
Condition of ASD Behaviour	$\mu_1 - \mu_2$	*d* [95% CI]	$\mu_1 - \mu_2$	*d* [95% CI]	$\mu_1 - \mu_2$	*d* [95% CI]	$\mu_1 - \mu_2$	*d* [95% CI]
Gaze Aversion	0.34	0.23 [-0.24, 0.70]	0.52	0.10 [-0.33, 0.53]	1.90*	0.52 [0.08, 0.96]	2.75	0.37 [-0.07, 0.81]
Repetitive Body Movements	0.28	0.20 [-0.26, 0.66]	-0.28	-0.06 [-0.51, 0.39]	-0.34	-0.10 [-0.55, 0.35]	0.88	0.15 [-0.31, 0.60]
Literal Interpretation of Figurative Language	0.34	0.21 [-0.24, 0.66]	3.59	0.64 [0.19, 1.08]	2.46**	0.62 [0.18, 1.07]	3.61	0.54 [0.10, 0.99]
Poor Reciprocity	0.71	0.44 [-0.04, 0.92]	0.86	0.16 [-0.29, 0.62]	0.15	0.04 [-0.41, 0.49]	1.53	0.23 [-0.23, 0.68]
Flat Affect	0.31	0.20 [-0.24, 0.65]	1.59	0.34 [-0.11, 0.80]	2.31*	0.63 [0.17, 1.09]	3.12	0.52 [0.06, 0.97]

*$p \leq .05$, **$p \leq .01$

than when they do not display such behaviour. The results revealed that individuals were perceived to be less caring when they displayed gaze aversion, literal interpretation of figurative language, or flat affect than when they did not display any ASD behaviour. However, there was no significant effect of repetitive body movements or poor reciprocity on any of the domains of credibility. Additionally, none of the ASD behaviours had a significant effect on judgments of deception. These findings not only fail to support the hypothesis but also contradict those of Experiment 1.

Two possible explanations exist for this large discrepancy. The first is that the findings of Experiment 1 may have been influenced by confounding variables such as the presentation order of the measures, variability of the stimulus materials, and level of participant attention, which were subsequently better controlled for in Experiment 2. The second possible explanation is that the effects of ASD behaviours on perceived deception and credibility are weak and were unable to be reliably detected across the two experiments. Therefore, to better understand these results, a direct replication of Experiment 2 was conducted. It was expected that if the discrepancy in findings was due to methodological differences between Experiment 1 and Experiment 2, a direct replication of Experiment 2 would yield consistent results. However, should the replication fail to support the results of Experiment 2, it is possible that this variability is indicative of weak and fragile effects.

EXPERIMENT 3

The design, materials, and procedure of this study were identical to those of Experiment 2.

Participants

A priori sample size estimations using G*Power 3.1 (Faul et al., 2007) suggested that a minimum sample size of 211 participants would be required to detect a medium effect (f = .25) at an alpha level of .05 and power of .80 in a one-way independent ANOVA with six

conditions. Thus, haphazard sampling was used to recruit a total of 496 participants via the online crowdsourcing platform TurkPrime (Litman et al., 2017). However, of these, 73 participants failed to pass attention checks, and the data from these participants were excluded from the analysis. The final sample consisted of 423 participants (211 female), ranging in age from 18 to 74 years (M = 37.69, SD = 11.61, Mdn = 34.13). Three hundred and seventy-two participants spoke English as their first language, and 125 participants were fluent in more than one language. Table 15 shows the distribution of participants by condition of ASD behaviour and measure completed.

Table 15

Number of Participants by Condition and Measure Completed (Experiment 3)

Condition of ASD Behaviour	*n*	
	Perceived Deception	Perceived Credibility
Gaze Aversion	32	37
Repetitive Body Movements	35	37
Literal Interpretation of Figurative Language	37	38
Poor Reciprocity	36	38
Flat Affect	33	31
Control Condition	34	35
Total	207	216

Results

Perceived Deception

An independent one-way ANOVA with ASD behaviour as the independent variable and perceived deception as the dependent variable was conducted. There was a significant

difference in ratings of perceived deception[23] between the six conditions of ASD behaviour, Welch's $F(5, 93.53) = 2.32$, $p = .05$, est. $\omega^2 = .03$. Multiple comparisons[24] indicated that individuals were perceived to be significantly more deceptive when they displayed literal interpretation of figurative language than when they did not display any ASD behaviour. However, there was no significant effect of gaze aversion, repetitive body movements, poor reciprocity, or flat affect on ratings of perceived deception (see Table 16).

Perceived Credibility

Three independent one-way ANOVAs with Bonferroni correction were conducted, with ASD behaviour as the independent variable and perceived competence, caring, and character as the dependent variables, respectively. There was a significant effect of ASD behaviour on ratings of perceived competence [$F(5, 210) = 3.41$, $p = .02$, $\eta_p^2 = .08$, 90% CI =.01, .12], caring [$F(5, 210) = 3.07$, $p = .03$, $\eta_p^2 = .07$, 90% CI = .01, .11], and character [$F(5, 210) = 3.44$, $p = .02$, $\eta_p^2 = .08$, 90% CI = .01, .12]. Multiple comparisons using Dunnett's test indicated that all five ASD behaviours led to lower ratings of perceived competence and character compared to when no ASD behaviour was displayed. In addition, individuals were also perceived to be less caring when they displayed gaze aversion or flat affect than when they did not display any ASD behaviour (see Table 16).

Discussion

The purpose of this replication was to examine whether the large discrepancy in findings between Experiment 1 and Experiment 2 could be attributed to methodological differences. The results of the present experiment indicated that all five target behaviours had significant effects on ratings of perceived competence and character. In addition, literal

[23] Perceived deception was found to be negatively skewed, and thus, a reflected logarithmic transformation was applied (see Appendix J).

[24] As Levene's test revealed that the assumption of equality of error variances was violated for ratings of perceived deception [$F(5, 201) = 2.56$, $p = .03$], five orthogonal contrasts with Bonferroni correction were used to compare ratings of perceived deception between the control condition and each of the experimental conditions.

Table 16

Differences in Ratings of Perceived Deception and Credibility between the Control Condition and Experimental Conditions (Experiment 3)

	Perceived Deception		Perceived Competence		Perceived Caring		Perceived Character	
Condition of ASD Behaviour	$\mu_1 - \mu_2$	*d* [95% CI]	$\mu_1 - \mu_2$	*d* [95% CI]	$\mu_1 - \mu_2$	*d* [95% CI]	$\mu_1 - \mu_2$	*d* [95% CI]
Gaze Aversion	0.07	0.45 [-0.04, 0.94]	4.21**	0.81 [0.32, 1.29]	3.09**	0.74 [0.27, 1.22]	5.19**	0.88 [0.40, 1.36]
Repetitive Body Movements	0.04	0.30 [-0.18, 0.77]	2.86*	0.63 [0.16, 1.11]	1.50	0.40 [-0.07, 0.86]	4.06*	0.63 [0.16, 1.11]
Literal Interpretation of Figurative Language	0.14**	0.77 [0.28, 1.25]	4.37***	0.86 [0.38, 1.34]	4.65	0.47 [0.005, 0.94]	3.44*	0.61 [0.14, 1.08]
Poor Reciprocity	0.03	0.18 [-0.29, 0.65]	3.45*	0.79 [0.32, 1.27]	1.75	0.49 [0.02, 0.95]	5.07**	0.78 [0.30, 1.26]
Flat Affect	0.05	0.32 [-0.17, 0.80]	3.73**	0.86 [0.36, 1.37]	3.27**	0.92 [0.41, 1.43]	5.32**	0.88 [0.37, 1.38]

*$p \leq .05$, **$p \leq .01$, ***$p \leq .001$

interpretation of figurative language had a significant effect on perceived deception, and gaze aversion and flat affect had significant effects on perceived caring. Thus, despite having an identical methodology to Experiment 2, the findings of the present experiment differed considerably from those of Experiment 2.

Past research has alluded to the existence of a strong and robust effect of gaze aversion and body movements on perceived deception. To test this claim, a priori sample size estimations in the present study were calculated to achieve .80 power to detect a medium effect (f = .25) – it was thought that if such large effects did indeed exist, these sample sizes would be sufficient for the hypothesised effects to be reliably detected across Experiment 2 and Experiment 3. However, given the differences in the patterns of significance obtained in Experiment 2 and Experiment 3 (that had identical methodology), it appears that the effects of ASD behaviours on judgments of deception and credibility may be weak. Therefore, to obtain an overall picture of the effect of ASD behaviours on perceived deception and credibility, a meta-analysis of the findings of Experiment 1, Experiment 2, and Experiment 3 was conducted.

META-ANALYSIS OF EXPERIMENT 1 TO EXPERIMENT 3

The effect sizes of the effects of gaze aversion, repetitive body movements, literal interpretation of figurative language, poor reciprocity, and flat affect on ratings of perceived deception, competence, caring, and character (see Tables 7, 14, and 16) were converted to *r* using formulas by Cohen (1988) and Rosenthal (1994).[25] The meta-analysis used a random-effects model based on the method by Hedges and Vevea (1998), in which each experiment was weighted according to sample size when computing the mean effect size. The meta-

[25] The use of *r* as a measure of effect size has several advantages. As suggested by Rosenthal and DiMatteo (2001), *d* can easily be converted to *r* without any loss of information, as "*r* in its point biserial form represents the relationship between two levels of the independent variable and scores on the dependent variable" (Rosenthal & DiMatteo, 2001, p. 71). Furthermore, unlike *d*, *r* is always constrained between 0 (no effect) and 1 (perfect effect) regardless of the variables in question, thus making its interpretation simple and easily understood (Field & Gillett, 2010).

analysis was carried out using IBM SPSS syntax files by Field and Gillett (2010). As shown in Table 17, the results revealed that overall, almost all ASD behaviours had small but statistically significant effects on judgments of deception, competence, caring, and character (the only exception being repetitive body movements, which did not have a significant effect on perceived competence or caring).

Table 17

Meta-Analysis of the Effect of ASD Behaviours on Perceived Deception and Credibility (Experiments 1-3)

ASD Behaviour	*r* [95% CI]			
	Deception	Competence	Caring	Character
Gaze Aversion	.23*** [.12, .34]	.23** [.06, .39]	.32*** [.22, .42]	.32*** [.20, .43]
Repetitive Body Movements	.20*** [.09, .31]	.18 [-.01, .35]	.14 [-.03, .30]	.23*** [.10, .36]
Literal Interpretation of Figurative Language	.19* [.04, .33]	.26** [.07, .43]	.21*** [.10, .31]	.20*** [.09, .31]
Poor Reciprocity	.14* [.03, .25]	.19* [.03, .34]	.16** [.05, .28]	.22*** [.09, .34]
Flat Affect	.14* [.03, .25]	.25*** [.13, .36]	.29*** [.18, .39]	.25*** [.10, .39]

*$p \leq .05$, **$p \leq .01$, ***$p \leq .001$

GENERAL DISCUSSION

The findings of Experiments 1 to 3 revealed that, overall, when individuals displayed gaze aversion, repetitive body movements, literal interpretation of figurative language, poor reciprocity, or flat affect, they were perceived as more deceptive and less credible than when they did not display any ASD behaviour. These results are in line with extensive past research that has found that gaze aversion and repetitive body movements are widely seen as indicators of deception (e.g., Akehurst et al., 1996; Delmas et al., 2019; Strömwall & Granhag, 2003). As suggested by Feldman and Chesley (1984), this effect can be interpreted in light of attribution theories, which consider “the perceived cause of another’s behaviour as

the basis for the interpretation of that behaviour" (p. 452). In the present experiments, the target individuals were interviewed on simple biographical questions in a non-threatening environment. It would be reasonable for participants to expect, then, that these individuals would be comfortable and confident during the interview. However, when the individuals demonstrated behaviours that were incongruent with these expectations, participants were led to search for possible causes of these unexpected behaviours, such as that the individuals were being deceptive.[26]

Gaze Aversion

Eye gaze has been known to be a widely relied upon source of social information, not only for humans, but also other primates such as chimpanzees (Hall et al., 2014) and rhesus macaques (Maestripieri & Wallen, 1997). It is proposed that this reliance on gaze cues may have evolved in certain primate species as a function of the increasing complexity of their social interactions with conspecifics (Emery, 2000). In humans, babies have been found to be able to differentiate direct gaze from averted gaze from as young as two to five days old, demonstrating a significant visual preference for faces that exhibit direct gaze compared to averted gaze (Farroni, Csibra, Simion, & Johnson, 2002). This innate ability to identify gaze direction may be assisted by the fact that human eyes have a large white sclera (instead of skin-coloured sclera like most other primates), thus making movement of the eyeballs more noticeable (Kobayashi & Kohshima, 1997).

However, in contrast to other primates, humans rely on gaze behaviour not only as a source of social information, but also as a means of communication (Senju & Csibra, 2008). A study by Senju and Csibra (2008) found that when an adult made eye contact with 6-month-old infants, the infants then followed the adult's gaze when the adult turned to look at

[26] Although these findings are consistent with the suggestion of attribution theories, attributions were not measured in the present experiments, and thus, the underlying cognitive mechanism by which the observed effects occurred could not be tested.

an object. However, if the adult did not engage in direct gaze toward the infants prior to turning to the object, the infants did not follow the adult's gaze. Direct gaze was perceived by the infants as an indicator of the adult's intent to communicate with them. There is thus a strong association between eye contact and the expectation of active communication. Therefore, when an individual does not conform to the social norm that eye contact is maintained during interpersonal communication, the observer is prompted to search for an explanation for this anomaly – and one possible explanation that may arise is that the individual is deceptive or non-credible.

Repetitive Body Movements

In 1915, Walter Cannon described a series of physiological changes that occur in response to perceived threat, which later became well known as the fight-or-flight response: when an individual experiences pain or fear, the adrenal medulla produces adrenaline, which leads to symptoms such as increased heart rate, increased blood sugar levels, increased blood flow to the central nervous system, and reduced muscle fatigue. Cannon (1915) proposed that the most significant feature of this reaction is the fact that it is an instinctive reflex that cannot be consciously controlled. Like all other reflexes, the fight-or-flight response is purposive in ensuring the wellbeing of the individual, as it prepares the individual with the energy needed to either fight or flee the potential threat (Cannon, 1915).

However, many modern-day situations that trigger fear do not necessitate fighting or fleeing. Consider, for example, a student walking into an examination or a patient receiving medical test results. Though both individuals would likely be experiencing feelings of fear or anxiety in response to the potential threat to their wellbeing (a poor grade or a medical illness), in neither situation would a physical response of fighting nor fleeing be appropriate. Yet because the fight-or-flight response is an uncontrollable reflex, the physiological changes

associated with fear still occur. The increased energy from high levels of adrenaline can then result in noticeable behaviours such as hand-wringing, nail-biting, and leg-shaking.

When there is no obvious threat to the individual, observers who notice these behaviours may question why the individual is fearful and begin to search for explanations. In the present experiments, the target individuals were interviewed on simple biographical questions, and no information was provided to the observers that could account for a fear-response. Therefore, when the target individuals displayed nervous behaviours such as repetitive body movements, observers may have attributed the behaviour to the fear of being caught out and surmised that the individuals were being deceptive.

This is consistent with the study by Feldman and Chesley (1984) which found that defendants who displayed nervous behaviours while being tried for a major crime were rated as more believable than defendants who displayed the same nervous behaviours while being tried for only a minor crime. When a defendant is tried for a major crime, any nervous behaviours displayed could be attributed to the fear of facing a heavy sentence if found guilty. However, when a defendant displays the same level of nervousness for only a minor crime (that therefore carries a lighter sentence), the fear of punishment may not be sufficient to explain the defendant's high anxiety. As a result, observers are left to search for other explanations for the defendant's behaviour, such as the fear of being exposed as deceptive.

The expectancy-violation model (Bond et al., 1992) and norm-violation model (Levine et al., 2000) thus argue that it is not the demonstration of specific cues per se that causes individuals to be perceived as deceptive or non-credible, but rather, the fact that the behaviours displayed are unexpected or incongruent with the circumstances of the situation. Based on this conjecture, it can be hypothesised that the demonstration of repetitive body movements may not consistently lead to increased perceptions of deception and non-credibility, as there may be circumstances in which it would be appropriate, or even expected,

that an individual experiences fear or anxiety. In such situations, perhaps a *lack* of nervous behaviour would be viewed as indicative of deception and non-credibility. Though this was not examined within the current project, it is an exciting avenue for further research.

Flat Affect

In the present study, it was found that when individuals demonstrated flat affect, they were perceived as more deceptive and less credible than when they displayed appropriate emotional expression. This finding is consistent with that of past research that has found that the emotionality of victims of abuse influences the extent to which they are perceived as credible witnesses – a phenomenon termed the "emotional victim effect" (Ask & Landström, 2010; Heath, 2009; Landström, Ask, Sommar, & Willén, 2015; Nitschke et al., 2019; Regan & Baker, 1998; Wessel et al., 2013). In line with the arguments of Feldman and Chesley (1984) and Bond et al. (1992), Ask and Landström (2010) found that this effect is mediated, in part, by the level of congruence between the observer's expectations and the target's behaviour.

Van Kleef (2010) proposes a further explanation for the importance of emotional expression in interpersonal judgments. He highlights that the very fact that emotions are expressed externally implies that they are not only functional at an individual level but also at an interpersonal level. He argues that prior to the emergence of language, emotions may have evolved out of the need to provide information to others about our feelings, goals, and intentions in order to navigate social relationships. Based on the premise that individuals often have limited insight into each other's thoughts and feelings, Van Kleef (2010) proposed the emotions as social information (EASI) model, which theorises that the information provided by emotional expression helps observers to better understand and respond to otherwise ambiguous social situations. The model specifies two mechanisms by which this is achieved: (1) expressed emotion evokes affective reactions in the observer, which then

influences their behaviour, and (2) expressed emotion triggers observers to infer information about the expresser's thoughts and feelings, which then influences their behaviour. The emotions as social information (EASI) model therefore proposes that the effect of flat affect on perceived deception and credibility may be due to the fact that observers are not able to infer much about the target individual's intentions. This notion is supported by a recent study by Alkhaldi, Sheppard, and Mitchell (2019), which found that ASD individuals were perceived to be more difficult to read than neurotypical individuals, and readability was significantly correlated with ratings of favourability. The authors thus suggest that ASD individuals may be perceived less favourably than their neurotypical peers because observers have difficulty inferring their thoughts, feelings, and intentions (Alkhaldi et al., 2019).

Literal Interpretation of Figurative Language and Poor Reciprocity

This project also investigated two ASD behaviours that have not previously been examined in the deception literature but could potentially be viewed as indicative of deception and non-credibility: literal interpretation of figurative language and poor reciprocity. The results of Experiments 1 to 3 indicated that when individuals demonstrated poor reciprocity or interpreted figurative language literally, they were perceived as more deceptive and less credible than when they did not. Although little is known about the relationship between these behaviours and deception or credibility, attribution theories (Kelley & Michela, 1980) may also help to explain this effect.

Studies on linguistic development have shown that children as young as two years old are able to take turns in conversation (Casillas & Frank, 2017), and children as young as eight years old are able to understand and use figurative language (Pollio & Pollio, 1974). Thus, when one is conversing with an adult, the expectation is that they would be able to accurately interpret and respond to figurative language, as well as engage in appropriate turn-taking. Consequently, when an individual responds literally to figurative language or engages in a

long monologue of irrelevant information, these expectations are violated, and the observer is left to search for an explanation for why the individual behaved that way. In the absence of any apparent intellectual disability, language impairment, or cultural differences, observers may attribute the behaviour to deception or non-credibility – the individual may be seen as trying to avoid or change the subject of conversation.

Inappropriate Emotional Displays

At the commencement of the project, inappropriate emotional displays was included as one of the ASD behaviours being investigated. The results of Experiment 1 revealed that there was no significant effect of inappropriate emotional displays on perceived deception or credibility. In Experiment 2, manipulation checks indicated that the target individuals' portrayal of inappropriate emotional displays was not sufficiently noticeable by participants who viewed the videos. It was suggested that this may be due to the fact that what constitutes an "appropriate" emotional response is highly dependent on the situational context. For example, laughing would typically be viewed as an appropriate response to hearing a joke but not an appropriate response to hearing of someone dying; in contrast, crying would typically be viewed as an appropriate response to hearing of someone dying but not an appropriate response to hearing a joke. In addition, the *extent* to which an incongruent emotion is viewed as deviant or inappropriate may also differ according to the situation. For example, although both are violations of social norms, laughing at someone dying is likely to be viewed as "more inappropriate" than crying at someone's joke.

Thus, it is possible that the degree to which inappropriate emotional displays affect judgments of deception and credibility is highly variable and dependent on the situation. Much of past research in this area has been carried out in the context of a court trial, particularly involving crimes of physical or sexual abuse (e.g., Kaufmann et al., 2003; Regan & Baker, 1998; Wessel et al., 2013; Wessel et al., 2012). This is significant as research has

shown that, in addition to expectancy violation, the relationship between emotionality and perceived veracity is also mediated by the affective response of the observer – the emotions displayed by the target individual evoke feelings of compassion in the observer, which subsequently affect their judgments of veracity (Ask & Landström, 2010). Furthermore, even within the context of victims of crime, there is evidence to suggest that the effect of displayed emotion on perceived credibility varies according to the type of crime in question (e.g., physical assault versus sexual assault; Bosma, Mulder, Pemberton, & Vingerhoets, 2018). It remains uncertain, then, whether inappropriate emotional displays would affect judgments of deception and credibility in situations that are less emotionally salient. It would be beneficial for future research to examine how the impact of inappropriate emotional displays on perceived deception and credibility varies across different contexts. However, as this was not within the scope of the current project, inappropriate emotional displays were not examined beyond Experiment 1.

Conclusion

Taken together, the current results appear to support the hypothesis that when individuals display gaze aversion, repetitive body movements, literal interpretation of figurative language, poor reciprocity, or flat affect, they would be perceived as more deceptive and less credible than when they do not display any ASD behaviour. However, the effect sizes obtained in the meta-analysis were small. One hypothesis is that this may have been due to the context of the stimulus videos, in which the target individuals did not have any apparent motive to be deceptive and were simply interviewed on biographical questions. This scenario was chosen to reduce the likelihood that other variables, such as the plausibility of responses and cost-benefit analyses, could influence the participants' judgments. It was thought that if significant effects of ASD behaviours on perceived deception and credibility could be detected even when there was no apparent motive for the target individuals to be

deceptive, such effects were also likely to be present when there was an obvious incentive to deceive. Therefore, to examine whether the effect of ASD behaviours on perceived deception and credibility would be stronger in situations where the target individual has greater motivation to be deceptive, Experiment 4 was conducted.

CHAPTER 3

The Effect of Autism Spectrum Disorder Behaviours on Perceived Deception and Credibility in Situations Involving Personal Gain

EXPERIMENT 4

The purpose of Experiment 4 was to examine how ASD behaviours affect judgments of deception and credibility specifically in situations where the target individual has a motive to deceive. Studies have shown that "a lie is more of a lie" when morality is violated for self-benefit as opposed to the benefit of others (Cantarero & Szarota, 2017, p. 315). Cantarero and Szarota (2017) provided the example of an individual telling their supervisor that they were busy when asked to work extra hours, even though this was not true. It was found that people were more likely to label that statement a lie if they were told that the individual did so because they simply did not feel like working, compared to if they were told that the individual knew that a colleague was struggling financially and needed the extra shifts. Even though the act was identical in both situations, the way it was perceived varied according to the motivation behind it. This tendency appears to develop at a young age, as children as young as six and seven years old have been found to view lies as less negative (Cheung, Siu, & Chen, 2015) and liars as more trustworthy (Fu, Heyman, Chen, Liu, & Lee, 2015) when lies are told for prosocial reasons. Therefore, new stimulus videos were developed for Experiment 4, which aimed to introduce the possibility that the target individuals were being deceptive for personal gain. It was hypothesised that individuals who display gaze aversion, repetitive body movements, literal interpretation of figurative language, poor reciprocity, or flat affect would be perceived as more deceptive and less credible than individuals who do not display these behaviours.

The argument of attribution theories for why behaviours such as gaze aversion and body movements affect judgments of deception and credibility is that these behaviours are unexpected and atypical, thus prompting observers to search for explanations for the behaviour (Feldman & Chesley, 1984). Based on this premise, it can be surmised that if an explanation was available that could account for the presence of these atypical behaviours,

the observer would be less likely to attribute the behaviours to deception or low credibility. To examine this possibility, this experiment also examined whether participants' ratings of deception and credibility would differ if they were informed that the target individual may have a diagnosis of ASD. It was hypothesised that once participants are informed that the target individual may have ASD, there would no longer be a significant effect of ASD behaviour on perceived deception and credibility.

Stimulus Development

Six professional actors (3 female) ranging in age from 19 to 65 years (M = 36.50, SD = 18.61, Mdn = 29.5) were involved in the production of these videos. Each actor attended a session at a psychology lab at Flinders University and were informed that the purpose of the session was to create videos that would be used in a research study on deception. They were told that they would be asked to complete a computer task and to then participate in a short interview that would be video recorded. Prior to the commencement of the task, the actors were shown an envelope and told that it contained $20. They were informed that: "People who watch this video will be told that you may have taken this money but are trying to convince the interviewer that you did not. They will be told that (1) participants who took the money but could successfully convince the interviewer that they did not would receive $50 for participating in the study, (2) participants who took the money but were caught by the interviewer as lying would only receive $10 for participating in the study, and (3) participants who chose not to take the money would receive $20 for participating in the study, irrespective of whether they were judged as lying or being truthful. After watching the video, they will be asked to indicate whether they think you are telling the truth. However, in reality, you are not to take the money in the envelope. In the interview, it is critical that you answer all questions truthfully." The actors were then left to complete the computer task, after which they were interviewed by a separate researcher. This interview was video recorded.

In each video, the actor was seated facing the camera with only their upper body in the camera frame. The interviewer was seated directly behind the camera and, therefore, was not visible in the videos. The actor was asked questions about the envelope in the room (e.g., “In the room, there was an envelope. Did you see this envelope?”), what they did (e.g., “Can you describe what you did after the researcher left the room?”), and whether they took the money (e.g., “Did you take the money that was in the envelope?”). Each actor completed the same interview six times (for a total of 36 stimulus videos), and each time, they were asked to display one of six conditions of ASD behaviour (see Table 18).

Table 18

Operationalisations of Conditions of ASD Behaviour (Experiment 4)

Condition of ASD Behaviour	Operationalisations
Gaze Aversion	The individual gazed downward or to either side throughout the interview.
Repetitive Body Movements	The individual demonstrated repetitive body movements throughout the interview (e.g., fidgeting, rocking, scratching).
Literal Interpretation of Figurative Language	The individual responded literally to the question, “Did you see anything at all that was *fishy* while you were in the room?”
Poor Reciprocity	The individual talked continuously and in great detail about a particular topic of interest (palm trees), without regard for the interviewer.
Flat Affect	The individual did not exhibit any (or limited) facial expression or vocal intonation throughout the interview.
Control Condition	The individual was not instructed to display any particular nonverbal behaviour.

To minimise the variation in verbal content between videos, the actors were provided with a standardised script of how they should respond to the interview questions (see Appendix K); however, all responses were truthful descriptions of what the actors had seen and done prior to the interview. The same script was used across all conditions of ASD behaviour, with the exception of the literal interpretation of figurative language condition and poor reciprocity condition. In the literal interpretation of figurative language condition, the script required actors to respond to one question ("Did you see anything at all that was *fishy* while you were in the room?") literally rather than figuratively. In the poor reciprocity condition, the script required actors to provide additional irrelevant information to approximate an individual talking excessively about a particular topic of interest. Each video was between two and four minutes long.

Preliminary Study

Prior to Experiment 4, a manipulation check was first conducted to ensure that the stimulus videos successfully captured the intended ASD behaviours.

Participants

A priori sample size estimations using G*Power 3.1 (Faul et al., 2007) suggested that a minimum sample size of 211 participants would be required to detect a medium effect (f = .25) at an alpha level of .05 and power of .80 in a one-way independent ANOVA with six conditions. Thus, haphazard sampling was used to recruit a total of 231 participants via the online crowdsourcing platform TurkPrime (Litman et al., 2017). However, the data from 55 participants were excluded from the analysis (28 participants failed to pass attention checks, six participants experienced technical difficulties, and 21 participants proceeded to the next page of the online study before the duration of the video was over),[27] resulting in a final sample of 176 participants (78 female) who ranged in age from 18 to 75 years (M = 38.02,

[27] The data exclusion criteria were determine a priori.

SD = 11.84, *Mdn* = 35.73). One hundred and seventy participants spoke English as their first language, and 29 participants were fluent in more than one language.

Materials

Stimulus materials. The 36 videos that were developed were used as stimulus materials, with each video depicting one of the six conditions of ASD behaviour (see Table 18).

Behaviourally anchored rating scales (BARS). Five behaviourally anchored rating scales (BARS) were used to measure the degree to which participants perceived the target individuals to have displayed each of the five ASD behaviours being investigated: gaze aversion, repetitive body movements, literal interpretation of figurative language, poor reciprocity, and flat affect. BARS were first introduced by Smith and Kendall (1963) to assist in obtaining more reliable and valid judgments of behaviour. Each point on a BARS is accompanied by a behavioural description that defines the level of the characteristic being rated, thus minimising subjective interpretation of the scale and allowing for greater consistency between different raters. BARS were found to produce less variance, less halo error, and less leniency error when compared to a summated ratings technique (Campbell, Dunnette, Arvey, & Hellervik, 1973).

The BARS used in the present study were all 4-point scales, with higher ratings indicating more socially appropriate behaviour (see Appendix L). For example, the BARS that measured gaze aversion ranged from 1 (*The person rarely made any eye contact with the interviewer and was observed to be glancing at other things in the room, e.g., hands, table, etc. Even if any eye contact was made, they were too short to be considered appropriate.*) to 4 (*The person exhibited appropriate eye contact with the interviewer throughout the interview. The person exhibited appropriate shifts in eye gaze.*). The order of presentation of the scales was randomised for each participant.

Attention checks. The two attention checks that were presented in the demographic questionnaires of previous experiments were again used in this study. At the end of the experiment, participants were also asked to identify what happened at the end of the video from a list of five options.

Procedure

The study was presented through an online survey platform (Qualtrics, Provo, UT). Participants first provided demographic information and were presented with two attention checks. Each participant was then shown one of the 36 stimulus videos and asked to rate the behaviours displayed by the individual in the video using the behaviourally anchored rating scales (BARS). Participants were presented with a third attention check, and lastly, were given the opportunity to indicate if they had experienced any technical difficulties during the study.

Results

The participants' ratings were grouped according to condition of ASD behaviour into a total of six groups: gaze aversion, repetitive body movements, literal interpretation of figurative language, poor reciprocity, flat affect, and control condition (i.e., no ASD behaviour displayed). To examine whether the actors' portrayal of each ASD behaviour was noticed by participants, five Kruskal-Wallis tests[28] with Bonferroni correction were conducted, with ASD behaviour as the independent variable and ratings of perceived gaze aversion, repetitive body movements, literal interpretation of figurative language, poor reciprocity, and flat affect as the dependent variables, respectively. There was a statistically significant difference between the six conditions in ratings of perceived gaze aversion [$\chi^2(5) = 68.88$, $p < .001$, $\eta^2 = .38$], repetitive body movements [$\chi^2(5) = 82.72$, $p < .001$, $\eta^2 = .46$],

[28] Six outliers with standard scores greater than |3.29| were detected and excluded from further analysis. The results did not differ when these outliers were included in the analysis. Examination of the values of skewness and kurtosis revealed that the distributions deviated substantially from normality (see Appendix M). Thus, non-parametric tests were used for data analysis.

literal interpretation of figurative language [$\chi^2(5) = 21.98$, $p = .01$, $\eta^2 = .10$], poor reciprocity [$\chi^2(5) = 75.23$, $p < .001$, $\eta^2 = .42$], and flat affect [$\chi^2(5) = 51.17$, $p < .001$, $\eta^2 = .27$].[29]

For each ASD behaviour, multiple comparisons were then carried out using five Mann-Whitney *U* tests with Bonferroni correction to examine whether the actors were rated as demonstrating significantly higher levels of the target behaviour for videos in the respective condition compared to videos in each of the other five conditions. A summary of these findings is shown in Table 19. The actors were rated as demonstrating significantly higher levels of the target behaviour for videos in the gaze aversion, repetitive body movements, and poor reciprocity conditions, compared to videos in all other conditions. However, there was no statistically significant difference in level of perceived literal interpretation of figurative language between videos in the literal interpretation of figurative language condition and videos in the gaze aversion, poor reciprocity, or control conditions. There was also no difference in level of perceived flat affect between videos in the flat affect condition and videos in the gaze aversion condition.

Discussion

The purpose of this preliminary study was to ensure that the target ASD behaviours were successfully manipulated in the proposed stimulus videos. It was found that the actors were rated significantly higher on gaze aversion, repetitive body movements, and poor reciprocity for videos in the respective condition compared to videos in all other conditions. Thus, the manipulation of gaze aversion, repetitive body movements, and poor reciprocity was effective.

The actors were also rated significantly higher on flat affect for videos in the flat affect condition compared to videos in the repetitive body movements, literal interpretation of figurative language, poor reciprocity, and control conditions. However, there was no

[29] Effect sizes were calculated using formulas by Lenhard and Lenhard (2016).

Table 19

Differences in Level of Perceived ASD Behaviour between the Target Condition and All Other Conditions (Experiment 4: Preliminary Study)

	Perceived Gaze Aversion		Perceived Body Movements		Perceived Literal Interpretation		Perceived Poor Reciprocity		Perceived Flat Affect	
Condition of ASD Behaviour	*U*	θ [95% CI]	*U*	θ [95% CI]	*U*	θ [95% CI]	*U*	θ [95% CI]	*U*	θ [95% CI]
Gaze Aversion	-	-	114.50***	.12 [.06, .24]	356.00	.44 [.30, .59]	83.00***	.11 [.05, .23]	338.00	.34 [.22, .49]
Repetitive Body Movements	96.00***	.10 [.04, .21]	-	-	287.50*	.32 [.21, .47]	95.00***	.11 [.05, .23]	230.00***	.21 [.12, .34]
Literal Interpretation of Figurative Language	38.00***	.05 [.02, .15]	28.00***	.03 [.01, .12]	-	-	94.00***	.13 [.06, .26]	219.50**	.25 [.15, .39]
Poor Reciprocity	47.00***	.06 [.02, .16]	61.00***	.07 [.03, .18]	347.00	.48 [.33, .63]	-	-	136.00***	.15 [.08, .28]
Flat Affect	77.00***	.08 [.03, .18]	11.00***	.01 [.001, .08]	228.00***	.23 [.15, .40]	64.00***	.07 [.03, .18]	-	-
Control Condition	43.00***	.06 [.02, .16]	82.50***	.10 [.04, .22]	232.50	.33 [.21, .49]	99.00***	.14 [.07, .28]	114.00***	.13 [.07, .26]

Note. Effect sizes were calculated based on the method by Newcombe (2006), where θ represents the degree of overlap between the values of the two samples. Values of θ range from 0 to 1, with 0 and 1 indicating no overlap and 0.5 indicating identical distributions. Each column shows the mean difference in ratings of the specified ASD behaviour between the target condition and each of the other five conditions.
*$p \leq .05$, **$p \leq .01$, ***$p \leq .001$

significant difference in level of perceived flat affect between the flat affect condition and the gaze aversion condition; that is, actors in the gaze aversion condition were also rated as demonstrating high levels of flat affect, despite the fact that this behaviour was not intentionally portrayed. One potential explanation for this finding is that participants may not have been able to obtain a clear view of the actors' faces when they averted their gaze, thus making it difficult for them to observe the actors' facial expressions. However, given that the difference in level of perceived flat affect between videos in the flat affect condition and control condition was statistically significant and demonstrated a large effect size ($p < .001$, $\theta = .14$), these stimulus videos were deemed to be acceptable for use in Experiment 4.

When the actors intentionally responded to figurative language literally (i.e., videos in the literal interpretation of figurative language condition), they were rated as demonstrating significantly greater literal interpretation of figurative language only in comparison to videos in the repetitive body movements and flat affect conditions. There was no significant difference in level of perceived literal interpretation of figurative language between videos in the literal interpretation of figurative language condition and videos in the gaze aversion, poor reciprocity, or control conditions. There were two possible explanations for this finding. The first was that participants simply did not notice the behaviour. This was possible given that there was only one instance when figurative language was used by the interviewer, and it occurred at the very end of the interview. The second possible explanation was that the rating system that was used was not capable of detecting differences in the behaviour between conditions.

The behaviourally anchored rating scale (BARS) that was used to measure perceived literal interpretation of figurative language was a 4-point scale: 1 (*The person demonstrated a misunderstanding of all figurative language used by the interviewer*), 2 (*The person demonstrated an appropriate understanding of some of the figurative language used by the*

interviewer), 3 (*The person demonstrated an appropriate understanding of most of the figurative language used by the interviewer*), and 4 (*The person demonstrated an appropriate understanding of all figurative language used by the interviewer*). Considering that there was only one instance when figurative language was used in each video, by definition, ratings should have been divided only between point 1 (misunderstanding of all figurative language) and point 4 (appropriate understanding of all figurative language). However, analysis of the frequency of responses revealed that, across all conditions, 26 participants (15.29%) provided a rating of 2, and 31 participants (18.24%) provided a rating of 3. This suggested that the anchors on the BARS may not have been suitable for use in the present study, thus leading to subjective individual interpretation.

To examine the possibility that the findings were due to ambiguous anchors on the BARS, the data were collapsed into two categories: (1) misunderstanding of figurative language (consisting of ratings of 1, 2, or 3 on the BARS), and (2) appropriate understanding of figurative language (consisting of ratings of 4 on the BARS). The responses were then analysed again using this dichotomous classification. Five Chi-squared tests with Bonferroni correction were carried out. The results revealed that the actors were significantly more likely to be rated as displaying a misunderstanding of figurative language in videos that were part of the literal interpretation of figurative language condition as compared to videos in the repetitive body movements condition [$\chi^2(1) = 9.16$, $p = .01$, $\varphi = .39$], flat affect condition [$\chi^2(1) = 14.62$, $p < .001$, $\varphi = .49$], or control condition [$\chi^2(1) = 6.94$, $p = .04$, $\varphi = .36$]. However, the actors were equally likely to be rated as displaying a misunderstanding of figurative language in videos that were part of the literal interpretation of figurative language condition and videos in the gaze aversion condition [$\chi^2(1) = 0.54$, $p = 1$, $\varphi = .10$] or poor reciprocity condition [$\chi^2(1) = 0.31$, $p = 1$, $\varphi = .08$]. Given that there was no significant difference in perception of literal interpretation of figurative language between these

conditions even after the data were collapsed into two categories, the videos developed for the literal interpretation of figurative language condition were not included in Experiment 4.

Method

Design

A 5 (ASD Behaviour: gaze aversion, repetitive body movements, poor reciprocity, flat affect, control condition) × 2 (Measure: deception, credibility) × 2 (Knowledge of ASD Diagnosis: absent, present) mixed design was used. The dependent variable for this study was perception of the target individual.

Participants

Haphazard sampling was used to recruit 106 participants from Flinders University and 425 participants from the online crowdsourcing platform TurkPrime (Litman et al., 2017). The data from 139 participants were excluded from the analysis (18 participants completed the task in less than one third of the median duration, 32 participants proceeded to the next page of the study before the duration of the video was over, 79 participants failed to pass attention checks, nine participants indicated suspicion that the target individual was an actor, and one participant experienced technical difficulties).[30] The final sample consisted of 392 participants (245 female), ranging in age from 18 to 84 years (M = 37.81, SD = 10.94, Mdn = 36.69). Three hundred and seventy-nine participants spoke English as their first language, and 55 participants were fluent in more than one language. Table 20 shows the distribution of participants by condition of ASD behaviour and measure completed. With an alpha level of .05 and power of .80, it is estimated that a minimum sample size of 196 participants would be required to detect a medium effect (f = .25) in a one-way independent ANOVA with five conditions (G*Power 3.1; Faul et al., 2007).

[30] The data exclusion criteria were determined a priori.

Table 20

Number of Participants by Condition and Measure Completed (Experiment 4)

Condition of ASD Behaviour	*n*	
	Perceived Deception	Perceived Credibility
Gaze Aversion	38	40
Repetitive Body Movements	39	38
Poor Reciprocity	39	43
Flat Affect	41	36
Control Condition	40	38
Total	197	195

Materials

Perceived motive to deceive. To introduce the possibility that the target individuals may have been deceptive for personal gain, participants were presented with the following paragraph: "You will be shown a short video segment of an individual being interviewed. The person you are about to see participated in a psychology experiment about lying. Upon arrival at the lab, they were asked to complete a short computer-based task. Before the task began, an envelope containing $20 was placed in front of them. They were told that they could take the money at any time, but that at the end of the study, they would be interviewed by a separate researcher who would attempt to determine if they had taken the money. If they took the money but could successfully convince the interviewer that they did not (i.e., they lied and got away with it), they would receive $50 for participating in the study. If they took the money and were caught by the interviewer (i.e., they lied but were caught out), they would only receive $10 for participating in the study. If they chose not to take the money, they would receive $20 for participating in the study, irrespective of whether they were

judged as lying or being truthful. The person was given until the end of the computer task to decide whether to take the money or not. After the computer task was over, the person was directed to a separate room where they were interviewed."

Manipulation check. To ensure that they had attended to and understood the information provided, participants were asked to, "Please match each possible outcome with the respective payment (drag and drop)." The possible outcomes listed were: "Took the money but successfully convinced the interviewer they did not (i.e., lied and got away with it)," "Took the money and got caught by the interviewer (i.e., lied but were caught out)," and "Did not take the money." The possible payment amounts listed were: $10, $20, and $50.

Stimulus videos. The 30 videos that demonstrated successful manipulation of ASD behaviour were used as stimulus materials in the present experiment. Each video was two to four minutes long and depicted an individual portraying one of the five conditions of ASD behaviour (i.e., no ASD behaviour for the control condition) while being interviewed about their experience in the psychology lab.

Perceived deception. Perceived deception was measured with two questions: "Do you think the person in the interview was telling the truth?" and "Do you think the person in the interview took the money?" Participants provided their responses on 6-point Likert scales, which ranged from 1 (*deceptive*) to 6 (*truthful*) and 1 (*yes*) to 6 (*no*), respectively. Responses from both questions were summed to obtain an overall score of perceived deception ranging from 2 to 12.

Perceived credibility. Participants were asked to rate the perceived credibility of the target individual using the modified measure of source credibility by McCroskey and Teven (1999).

Behaviourally anchored rating scales (BARS). The behaviourally anchored rating scales (BARS) for gaze aversion, repetitive body movements, poor reciprocity, and flat affect administered in the Preliminary Study were also presented to the participants.

Attention checks. The attention checks that were used in the Preliminary Study were again used.

Procedure

This study was presented through an online survey platform (Qualtrics, Provo, UT). Participants recruited from TurkPrime accessed and completed the study at a time and location of their choosing, while participants recruited from Flinders University completed the study in a psychology lab on campus. To avoid response bias, participants were not informed of the true purpose of the study but were instead told that the study aimed to investigate deception detection abilities. Participants were informed that they were about to be shown a video of an individual being interviewed and were presented with a short paragraph detailing the context of the interview. To ensure that participants had attended to and understood the information provided, a manipulation check was conducted. Participants who failed to pass the manipulation check were presented with the information again. The same manipulation check was then repeated. It was determined a priori that data from participants who failed to pass the manipulation check a second time would be excluded from the analysis.

Each participant was then shown one of the 30 stimulus videos and after the video, was asked to indicate their perception of the individual on one of the two measures. Participants were also asked to briefly describe the reasons for their impression (they were encouraged to state “unsure” if they were uncertain). Using the BARS, participants were then asked to rate the degree to which the individual in the video displayed each of the four ASD behaviours being investigated.

Next, participants were told, "Now if you were to be told that the person in the interview has Autism Spectrum Disorder (ASD), please rate your impression of the person in the interview again in light of this new information. Characteristics of ASD include difficulties with social interaction and nonverbal communication, repetitive behaviours, and restricted interests." They were then asked to rate their impression of the individual a second time, using the same measure they had previously completed. Finally, a funnel debriefing procedure was used to identify any possible suspicion about the deception, and participants were debriefed on the true purpose of the study.

Results

Manipulation of ASD Behaviours

To examine whether the intended ASD behaviours were noticed by participants, four Kruskal-Wallis tests[31] with Bonferroni correction were conducted, with ASD behaviour as the independent variable and ratings of perceived gaze aversion, repetitive body movements, poor reciprocity, and flat affect as the dependent variables, respectively. There was a statistically significant difference between the five conditions in ratings of perceived gaze aversion [$\chi^2(4) = 192.13$, $p < .001$, $\eta^2 = .49$], repetitive body movements [$\chi^2(4) = 163.10$, $p < .001$, $\eta^2 = .41$], poor reciprocity [$\chi^2(4) = 217.45$, $p < .001$, $\eta^2 = .56$], and flat affect [$\chi^2(4) = 106.14$, $p < .001$, $\eta^2 = .26$].[32] For each ASD behaviour, multiple comparisons were then carried out using four Mann-Whitney *U* tests with Bonferroni correction to examine whether the target individuals were rated as demonstrating significantly higher levels of the intended behaviour for videos in the respective condition compared to videos in each of the other four

[31] Seven outliers with standard scores greater than |3.29| were detected and excluded from the analysis. The results did not differ when these outliers were included in the analysis. Examination of the values of skewness and kurtosis revealed that the distributions deviated substantially from normality (see Appendix N). Thus, non-parametric tests were used for data analysis.

[32] Effect sizes were calculated using formulas by Lenhard and Lenhard (2016).

conditions. A summary of these findings is shown in Table 21. Taken together, the results suggest that the manipulation of the target ASD behaviours was successful.

Hypothesis Testing

Perceived deception. An independent one-way ANOVA with ASD behaviour as the independent variable and perceived deception[33] as the dependent variable was conducted. The results indicated a significant difference in ratings of perceived deception between the five conditions, $F(4, 192) = 4.39$, $p = .002$, $\eta_p^2 = .08$, 90% CI [.02, .14]. Multiple comparisons using Dunnett's test revealed that the target individuals were rated as more deceptive when they displayed repetitive body movements or poor reciprocity than when they did not display any ASD behaviour. Gaze aversion and flat affect did not affect ratings of perceived deception (see Table 22).

Perceived credibility. Three independent one-way ANOVAs with Bonferroni correction were conducted, with ASD behaviour as the independent variable and perceived competence, caring, and character as the dependent variables, respectively.[34] There were no significant differences in ratings of perceived competence [$F(4, 189) = 1.38$, $p = .73$, $\eta_p^2 = .03$, 90% CI = 0, .06] or character [$F(4, 189) = .77$, $p = 1$, $\eta_p^2 = .02$, 90% CI = 0, .04] between the five conditions. However, there was a significant effect of ASD behaviour on ratings of perceived caring, $F(4, 189) = 3.76$, $p = .02$, $\eta_p^2 = .07$, 90% CI [.01, .12]. Multiple comparisons using Dunnett's test revealed that the target individuals were rated as less caring when they displayed poor reciprocity or flat affect than when they did not display any ASD behaviour (see Table 22).

[33] Perceived deception was found to be positively skewed. Thus, a logarithmic transformation was applied (see Appendix N).
[34] The response of one participant was removed due to incomplete data.

Table 21

Differences in Level of Perceived ASD Behaviour between the Target Condition and All Other Conditions (Experiment 4)

	Perceived Gaze Aversion		Perceived Body Movements		Perceived Poor Reciprocity		Perceived Flat Affect	
Condition of ASD Behaviour	*U*	*θ* [95% CI]	*U*	*θ* [95% CI]	*U*	*θ* [95% CI]	*U*	*θ* [95% CI]
Gaze Aversion	-	-	647.00***	.11 [.07, .18]	483.00***	.08 [.04, .13]	1712.50***	.29 [.21, .37]
Repetitive Body Movements	342.50***	.06 [.03, .11]	-	-	292.50***	.05 [.02, .10]	992.50***	.17 [.11, .24]
Poor Reciprocity	383.00***	.06 [.03, .11]	485.00***	.08 [.05, .14]	-	-	937.00***	.15 [.10, .22]
Flat Affect	78.50***	.01 [.004, .05]	234.00***	.04 [.02, .09]	222.50***	.04 [.02, .08]	-	-
Control Condition	177.00***	.03 [.01, .07]	516.00***	.09 [.05, .15]	316.00***	.05 [.02, .10]	835.50***	.14 [.09, .21]

Note. Effect sizes were calculated based on the method by Newcombe (2006), where *θ* represents the degree of overlap between the values of the two samples. Values of *θ* range from 0 to 1, with 0 and 1 indicating no overlap and 0.5 indicating identical distributions. Each column shows the mean difference in ratings of the specified ASD behaviour between the target condition and each of the other four conditions.
***$p \leq .001$

Table 22

Differences in Ratings of Perceived Deception and Credibility between the Control Condition and Experimental Conditions (Experiment 4)

	Perceived Deception		Perceived Competence		Perceived Caring		Perceived Character	
Condition of ASD Behaviour	$\mu_1 - \mu_2$	*d* [95% CI]	$\mu_1 - \mu_2$	*d* [95% CI]	$\mu_1 - \mu_2$	*d* [95% CI]	$\mu_1 - \mu_2$	*d* [95% CI]
Gaze Aversion	0.08	0.30 [-0.15, 0.74]	1.12	0.27 [-0.18, 0.72]	0.59	0.18 [-0.26, 0.63]	2.09	0.28 [-0.17, 0.73]
Repetitive Body Movements	0.19**	0.70 [0.24, 1.15]	0.61	0.14 [-0.31, 0.60]	1.02	0.31 [-0.14, 0.77]	0.88	0.12 [-0.33, 0.57]
Poor Reciprocity	0.15*	0.53 [0.09, 0.98]	-0.96	-0.22 [-0.66, 0.22]	2.24**	0.68 [0.23, 1.13]	2.71	0.36 [-0.09, 0.80]
Flat Affect	-0.01	-0.04 [-0.48, 0.39]	0.69	0.15 [-0.31, 0.61]	2.29**	0.67 [0.20, 1.14]	1.32	0.16 [-0.30, 0.62]

*$p \leq .05$, **$p \leq .01$

Awareness of Cues Used

Participants' qualitative responses of the reasons for their impression were also examined in order to gain an understanding of whether participants were aware that ASD behaviours had influenced their judgments of deception or credibility. Given that only repetitive body movements and poor reciprocity had significant effects on perceived deception, and poor reciprocity and flat affect on perceived caring, only the responses from participants in these conditions are presented. Each response was sorted into one of four categories: target behaviour, other behaviour, overall impression, and unsure. Any response that included the target behaviour was categorised as "target behaviour" regardless of whether other cues were also listed. Responses that did not include the target behaviour but mentioned at least one other specific behaviour (e.g., "she was hesitating," "the subject said 'um' a lot," "her posture was slightly slouched") were categorised as "other behaviour." Responses that made reference to an overall perception of the individual without mention of any specific behaviours were categorised as "overall impression" (e.g., "he seemed honest and genuine," "she seems nervous," "just from the way she acted," "my gut feeling").[35] The findings suggested that while the majority of participants in the repetitive body movements and poor reciprocity conditions were aware that these behaviours had influenced their judgments of deception, participants who were asked to provide ratings of credibility were less likely to acknowledge the impact of the target ASD behaviours on their impression of the individual in the video (see Table 23).

[35] To ensure the reliability of the analysis, a research assistant also independently coded the data. Inter-rater reliability using Cohen's kappa (κ) ranged from .69 to .88, while inter-rater reliability using Gwet's AC1 (Gwet, 2008) ranged from .79 to .92 (see Appendix O).

Table 23

Percentage of Participants Who Reported the Use of Each Cue

	Perceived Deception		Perceived Credibility	
	Repetitive Body Movements (*n* = 39)	Poor Reciprocity (*n* = 39)	Poor Reciprocity (*n* = 43)	Flat Affect (*n* = 36)
Target Behaviour	69.23	56.41	34.88	27.78
Other Behaviour	23.08	17.95	27.91	27.78
Overall Impression	5.13	17.95	20.93	36.11
Unsure	2.56	7.69	16.28	8.33

Knowledge of ASD Diagnosis

To examine whether the effect of ASD behaviours on judgments of deception and credibility would differ if participants were told that the target individuals may have ASD, follow-up analyses were carried out.

Perceived deception. A mixed two-way ANOVA was conducted, with ASD behaviour and knowledge of ASD diagnosis as the independent variables, and perceived deception as the dependent variable. There was a significant interaction effect of ASD behaviour and knowledge of ASD diagnosis on ratings of perceived deception, $F(4, 192) = 2.59$, $p = .04$, $\eta_p^2 = .05$, 90% CI [.001, .09]. A follow-up independent one-way ANOVA revealed that once participants were told that the target individuals may have ASD, there was no significant effect of ASD behaviour on judgments of deception, $F(4, 192) = 0.98$, $p = .42$, $\eta_p^2 = .02$, 90% CI [0, .04]. In addition, there was also a significant main effect of knowledge of ASD diagnosis, which indicated that, overall, participants rated the target individuals as less deceptive after they had been told that the target individuals may have ASD, $F(1, 192) = 133.60$, $p < .001$, $\eta_p^2 = .41$, 90% CI [.32, .48].

Perceived credibility. Three mixed two-way ANOVAs with Bonferroni correction were conducted, with ASD behaviour and knowledge of ASD diagnosis as the independent variables, and perceived competence, caring, and character as the dependent variables, respectively. There was no significant interaction effect of ASD behaviour and knowledge of ASD diagnosis on ratings of perceived competence [$F(4, 189) = 0.97$, $p = 1$, $\eta_p^2 = .02$, 90% CI = 0, .04], caring [$F(4, 189) = 0.36$, $p = 1$, $\eta_p^2 = .01$, 90% CI = 0, .02], or character[36] [$F(4, 188) = 0.75$, $p = 1$, $\eta_p^2 = .02$, 90% CI = 0, .04], which suggested that the effect of ASD behaviours on judgments of credibility was not dependent on participants' knowledge of the target individuals' diagnostic status.[37] However, there was a significant main effect of knowledge of ASD diagnosis on ratings of perceived caring [$F(1, 189) = 13.57$, $p < .001$, $\eta_p^2 = .07$, 90% CI = .02, .13] and character [$F(1, 188) = 77.40$, $p < .001$, $\eta_p^2 = .29$, 90% CI = .20, .37]. Overall, participants rated the target individuals as more caring and of higher character once they had been told that the target individuals may have ASD. There was no significant main effect of knowledge of ASD diagnosis on ratings of perceived competence [$F(1, 189) = 0.004$, $p = 1$, $\eta_p^2 < .001$], thus indicating that participants' perceptions of the target individuals' level of competence did not change after being informed that the target individuals may have ASD.

Discussion

The results of the present experiment indicated that individuals were perceived as more deceptive when they displayed repetitive body movements or poor reciprocity compared to when they did not display any ASD behaviour. In addition, individuals were also perceived to be less caring when they displayed poor reciprocity or flat affect than when they

[36] One outlier ($z = -3.36$) was detected for perceived character and excluded from the analysis. The results did not differ when this outlier was included in the analysis.

[37] Because no significant effect of ASD behaviours on perceived competence or character was detected prior to participants being informed that the target individuals may have ASD, it was not expected that any interaction effects would be found. Therefore, the main effect of knowledge of ASD diagnosis on perceived competence, caring, and character was also examined.

did not display any ASD behaviour. However, gaze aversion did not affect judgments of deception or credibility.

The present experiment also examined whether participants' perceptions of the target individuals would change if they were told that the target individuals may have ASD. It was found that once the possibility that the target individuals had ASD was introduced, there was no longer a significant effect of repetitive body movements or poor reciprocity on perceived deception – individuals were rated similarly on perceived deception regardless of whether they displayed an ASD behaviour or not. In addition, the overall mean rating of perceived deception across conditions also decreased after participants were told that the target individuals may have ASD. This is in line with the proposition of attribution theories that an individual's judgment of the cause of another's behaviour is re-evaluated when new information comes to light (Feldman & Chesley, 1984; Kelley & Michela, 1980). Prior to being given any information on the individuals' diagnostic status, participants had no obvious explanation for why the target individuals were displaying repetitive body movements or poor reciprocity – behaviours that are not congruent with social norms. They were therefore led to search for a cause to which the behaviours could be attributed, such as that the individuals were being deceptive. However, when new information was then made available that the individuals could have ASD, the likelihood that deception was the cause of the behaviour was diminished. Though these findings are preliminary, they suggest that biased deception judgements against ASD individuals can be negated by providing information about their diagnostic status (see also Castillo & Mallard, 2012; Maras, Marshall, & Sands, 2019).

There was no change in the relationship between ASD behaviours and perceived credibility after the possibility that the target individuals had ASD was introduced. However, there was an overall increase in ratings of perceived caring and character. These findings are

consistent with research by Matthews, Ly, and Goldberg (2015) which found that college students expressed more positive cognitive and behavioural attitudes toward a hypothetical peer who displayed ASD behaviours when they knew of his ASD diagnosis than when they did not. Matthews et al. (2015) propose that this positive reaction may reflect increasing societal awareness of ASD (Tipton & Blacher, 2014) and the fact that there is less stigma associated with ASD than other with disorders (Feldman & Crandall, 2007; Gifford & Knott, 2016). Perceived competence did not appear to be affected by knowledge of ASD diagnosis, as participants' ratings of perceived competence before and after the information was presented did not differ. Although it is uncertain why this was the case, one hypothesis is that the label "Autism Spectrum *Disorder*" inherently implies some form of deficit in skill or ability.

To examine whether participants in the present experiment were aware of the cues they used in forming their judgments of deception and credibility, participants were asked to briefly explain the reasons for their impression. It was found that the majority of participants in the repetitive body movements (69.23%) and poor reciprocity (56.41%) conditions identified that the respective target behaviour had (to some degree) influenced their judgment of deception. However, participants who were asked to provide ratings of credibility were less aware that the target behaviour had affected their ratings, with only 34.88% of participants in the poor reciprocity condition and 27.78% of participants in the flat affect condition indicating that the respective target behaviour had influenced their impression. This is consistent with research that has shown that individuals are not always conscious of the cues they rely on when forming interpersonal judgments (Kaufmann et al., 2003).

META-ANALYSIS OF EXPERIMENT 1 TO EXPERIMENT 4

To examine how the mean effect sizes of ASD behaviours on perceived deception and credibility in the present project would differ upon the inclusion of the findings of

Experiment 4 (see Table 22), a second meta-analysis was conducted, using the same approach previously described in Chapter 2. As shown in Table 24, the results revealed that similar to the first meta-analysis (see Table 17), almost all ASD behaviours had small but statistically significant effects on judgments of deception, competence, caring, and character (in the present analysis, poor reciprocity did not have a significant effect on perceived competence).

Table 24

Meta-Analysis of the Effect of ASD Behaviours on Perceived Deception and Credibility (Experiments 1-4)

ASD Behaviour	*r* [95% CI]			
	Deception	Competence	Caring	Character
Gaze Aversion	.22*** [.12, .31]	.21** [.08, .34]	.27*** [.16, .38]	.28*** [.16, .39]
Repetitive Body Movements	.23*** [.13, .32]	.16* [.01, .29]	.15* [.03, .26]	.19** [.07, .32]
Literal Interpretation of Figurative Language	.19* [.04, .33]	.26** [.07, .43]	.21*** [.10, .31]	.20*** [.09, .31]
Poor Reciprocity	.17*** [.06, .26]	.12 [-.06, .30]	.20*** [.08, .31]	.21*** [.11, .30]
Flat Affect	.11* [.01, .20]	.21*** [.09, .33]	.30*** [.20, .39]	.21** [.08, .34]

*$p \leq .05$, **$p \leq .01$, ***$p \leq .001$

Considering that the effects detected in the meta-analysis of Experiments 1 to 4 were small, the findings of the present project do not appear to replicate the strong and robust effect of gaze aversion on judgments of deception and credibility that has been reported in past research. To better understand whether this discrepancy in findings was due to important methodological differences or confounding variables that were not accounted for in the present project, a closer review of past research was undertaken. Eleven studies were identified as having experimentally examined the effect of gaze aversion on judgments of deception (Au & Wong, 2019; Einav & Hood, 2008; Feldman & Chesley, 1984; Hendry,

Shaffer, & Peacock, 1989; Kraut & Poe, 1980; Riggio & Friedman, 1983; Slessor et al., 2012; Stiff et al., 1989; Willis & Wrightsman, 1995) or credibility (Neal & Brodsky, 2008; Reinhard & Sporer, 2008) specifically. Of these, seven studies (Au & Wong, 2019; Feldman & Chesley, 1984; Hendry et al., 1989; Kraut & Poe, 1980; Reinhard & Sporer, 2008; Riggio & Friedman, 1983; Stiff et al., 1989) included gaze aversion as part of a broader investigation of the relationship between nonverbal behaviour and interpersonal perception. As a result, gaze aversion was manipulated in combination with several other cues thought to be indicative of deception or non-credibility (e.g., posture shifts, speech hesitations) – the target individual either displayed all of the examined behaviours or none (or low levels) of the examined behaviours. In these situations, it is difficult to ascertain if any one particular behaviour affects judgments of deception or credibility, or if the effect only occurs when certain combinations of behaviours are present. For example, it may be that the observed effect is due to the presence of body movements, and thus, when only gaze aversion is examined, no significant effect on perceived deception or credibility is detected. Alternatively, perhaps it is the presence of multiple behaviours simultaneously that leads to increased perceptions of deception and non-credibility, and that any one of those behaviours in isolation would have no significant effect.

Four studies were identified as having manipulated gaze aversion specifically, to examine its effect on judgments of deception or credibility. While all four studies found that gaze aversion led to significantly lower perceptions of truthfulness or credibility, effect sizes ranged from small (Willis & Wrightsman, 1995) to medium (Neal & Brodsky, 2008) to large (Einav & Hood, 2008; Slessor et al., 2012). In addition, the context in which these experiments were carried out varied considerably. Einav and Hood (2008) and Slessor et al. (2012) investigated whether young children and older adults, respectively, use gaze aversion as a cue to deception in everyday lying situations, while Willis and Wrightsman (1995)

focused specifically on the testimony of rape victims and Neal and Brodsky (2008) on the perceived credibility of expert witnesses. These findings suggest that the effect of gaze aversion on judgments of deception and credibility may be moderated by multiple other variables, such as the type of statement being made and the demographic characteristics of both the target individual and the observer.

Overall, the meta-analysis of Experiments 1 to 4 revealed statistically significant effects of ASD behaviours on judgments of deception and credibility. However, as demonstrated by the small effect sizes, these effects appear to be weak. In contrast, several past studies have demonstrated large effects of certain ASD behaviours (e.g., gaze aversion) on judgments of deception and credibility. One possible explanation for this discrepancy is that these effects may be moderated by multiple other variables, such as situational factors, demographic characteristics, and the concurrent demonstration of other behaviours. Therefore, to examine how the target behaviours would influence judgments of deception and credibility specifically toward an ASD sample, Experiment 5 was conducted.

CHAPTER 4

Are Autism Spectrum Disorder Individuals More Vulnerable to Being Perceived as Deceptive and Non-Credible?

EXPERIMENT 5

The purpose of this experiment was to examine the effect of naturally occurring ASD behaviours on judgments of deception and credibility toward ASD individuals. In Experiments 1 to 4, actors were used to portray the ASD behaviours of interest in this study, namely, gaze aversion, repetitive body movements, literal interpretation of figurative language, poor reciprocity, and flat affect. The decision was made to use actors in the production of the stimulus videos to allow for greater control over the behaviours being demonstrated, thus ensuring that (1) only one target behaviour was displayed for each condition, (2) the presence of other verbal and nonverbal behaviours that may influence judgments of deception and credibility was minimised, and (3) the verbal content of the videos was consistent across individuals (in Experiments 2 to 4). While this approach allowed for the examination of the effect of each individual behaviour on judgments of deception and credibility, it also presented several limitations.

Firstly, ASD behaviours do not always occur independent of each other, and it is likely that an ASD individual would demonstrate several behaviours simultaneously. Therefore, stimulus videos that portray only one target behaviour at a time may not be an accurate representation of how ASD individuals would present in a similar situation. Second, Experiments 1 to 4 only examined how judgments of deception and credibility differed when the target behaviour was absent versus present and did not take into consideration the varying degrees to which the behaviour could be demonstrated. In reality, ASD occurs on a spectrum, and the range and intensity of symptoms experienced can differ substantially from person to person. Finally, given that all the actors who were involved in the production of the stimulus videos were neurotypical individuals, it must also be acknowledged that their portrayal of the target behaviours may not have been as realistic and natural as that of an ASD individual.

In light of the findings and limitations of Experiments 1 to 4, Experiment 5 was conducted to examine whether ASD individuals are more likely to be perceived as deceptive and non-credible than neurotypical individuals, and if so, whether this relationship is mediated by the demonstration of gaze aversion, repetitive body movements, literal interpretation of figurative language, poor reciprocity, and flat affect. It was hypothesised that (1) ASD individuals would be perceived as more deceptive and less credible than neurotypical individuals, (2) ASD individuals would display higher levels of gaze aversion, repetitive body movements, literal interpretation of figurative language, poor reciprocity, and flat affect than neurotypical individuals, (3) gaze aversion, repetitive body movements, literal interpretation of figurative language, poor reciprocity, and flat affect would be significant predictors of perceived deception and credibility, and (4) gaze aversion, repetitive body movements, literal interpretation of figurative language, poor reciprocity, and flat affect would mediate the relationship between ASD diagnosis and perceived deception and credibility.

Stimulus Development

To address the research questions, new stimulus videos were developed for use in Experiment 5. Thirty-one ASD individuals (nine female) and 29 neurotypical individuals (15 female) ranging in age from 18 to 66 years (M = 29.62, SD = 11.57, Mdn = 25.00) were involved in the production of these videos (see Appendix P). Twenty-one ASD individuals were recruited from the Flinders University Autism Spectrum Disorder Database, which comprises individuals with ASD who reside in South Australia and have indicated interest in participating in research projects at Flinders University (the majority of individuals on this database were originally recruited through a mail out by Autism SA, the state ASD association). The remaining ten ASD individuals were recruited through an advertisement at a local psychology practice that specialises in the diagnosis and treatment of ASD. All 31

individuals reported receiving a formal diagnosis of ASD from a trained professional. In the state of South Australia, in order to access support services from Autism SA, individuals must have received a diagnosis of ASD from at least two independent registered diagnosticians (i.e., speech pathologist, psychologist, paediatrician, or psychiatrist) or from a registered multidisciplinary team. While a number of these individuals would have received their diagnosis based on the diagnostic classifications of the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision (DSM-IV-TR), current DSM-5 diagnostic criteria for ASD specify that individuals with an established DSM-IV diagnosis of autistic disorder, Asperger's disorder, or pervasive developmental disorder not otherwise specified should be considered as having ASD (American Psychiatric Association, 2013). The 29 neurotypical individuals were all students recruited from Flinders University who reported that they did not have a diagnosis of ASD.

The procedure used to create the stimulus videos was identical to that employed in Experiment 4: each individual completed a short task in a psychology lab and was subsequently interviewed about whether they had taken money from an envelope that was in the lab while they were there. However, in contrast to Experiment 4, the individuals were not informed of the interview questions prior to the session, nor were they provided with a script of how to respond. Instead, they were simply instructed to answer all questions truthfully. The video from one ASD individual was excluded from the study as the truthfulness of his responses could not be ascertained, resulting in a final sample of 30 ASD individuals (nine female) and 29 neurotypical individuals (15 female). Of the ASD sample, 20 individuals had an intelligence quotient (IQ) above 85, as previously assessed using the Wechsler Abbreviated Scale of Intelligence – Second Edition (WASI-II; Wechsler, 2011), but the IQ levels of the remaining 10 individuals were unknown. Likewise, no information was available regarding the IQ levels of the neurotypical individuals; however, they were all university

students. All individuals in the final sample told the truth about whether they had taken the money.[38] The videos ranged in duration from 95 seconds to 290 seconds (M = 132, SD = 33).

Behavioural Analysis

The videos were analysed and coded for the presence of each of the five ASD behaviours by a research assistant who was not involved in any other aspect of this project and was blind to both the purpose of the study and group membership of the target individuals. To ensure the reliability of the behavioural analysis, I also independently analysed and coded all 59 videos.

Prior to coding the stimulus videos, both raters were first trained on a set of six videos that were selected from the videos used in Experiment 4. We watched each training video five separate times and independently recorded the presence of gaze aversion, repetitive body movements, literal interpretation of figurative language, poor reciprocity, and flat affect, respectively, using a behavioural coding scheme that was developed for this study (see Appendix Q). The order of presentation of the videos was randomised for each behaviour and coder. Inter-rater reliability for the coding of gaze aversion, repetitive body movements, and poor reciprocity for the training videos was then assessed using three separate two-way random, consistency, single-measures intraclass correlations (ICC), while inter-rater reliability for the coding of literal interpretation of figurative language and flat affect was assessed using Cohen's kappa (κ) and linearly weighted Cohen's kappa (κ_w), respectively.

Inter-rater reliability was high for the coding of gaze aversion (ICC = 1), repetitive body movements (ICC = .82), literal interpretation of figurative language (κ = 1), and poor reciprocity (ICC = 1), but poor for ratings of flat affect (κ_w = .53). In addition, we also

[38] Fourteen individuals (seven ASD individuals and seven neurotypical individuals) provided one or more responses in the interview that were factually incorrect (e.g., saying that they had not been told about the different payment outcomes). However, as these responses were likely the result of inattention, rather than the desire to purposefully mislead the interviewer, they were not considered to be deceptive for the purpose of this experiment. All individuals correctly reported that they had not taken the money.

observed that the coding guidelines for repetitive body movements were not sufficiently clear, which resulted in uncertainty about what should be coded. Discrepancies in the coding of repetitive body movements and flat affect were thus discussed, and the coding systems were revised accordingly to reduce ambiguity. We then watched six new training videos that were selected from the videos used in Experiment 4 and independently recorded the presence of repetitive body movements and flat affect using the updated coding guidelines. Inter-rater reliability was excellent for the coding of repetitive body movements (ICC = .92) and acceptable for the coding of flat affect (κ_w = .63).

Gaze aversion. Because the interviewer was seated directly behind the camera and was not visible in the videos, it was not possible to identify exactly when the individual made eye contact with the interviewer. Thus, the duration of time in which the individual gazed at the interviewer's face was used as an approximation of the duration of time the individual maintained eye contact with the interviewer. This is supported by research by Rogers, Guidetti, Speelman, Longmuir, and Phillips (2019), which found that there was no difference in level of perceived eye contact between individuals whose conversation partner gazed at their eyes and individuals whose conversation partner gazed at their mouth. In other words, individuals are not sensitive to the specific area of the face their conversation partner is gazing at during natural conversation, and gazing directly toward the face is sufficient to be perceived as making eye contact (Rogers et al., 2019; Rogers, Speelman, Guidetti, & Longmuir, 2018).

We observed and recorded the timestamp of the video at the start and end of each interval the individual maintained direct gaze at the interviewer. A measure of gaze aversion was obtained by subtracting the total duration of time the individual maintained direct gaze at the interviewer from the total duration of the interview. To account for the varying lengths of the interviews, this was then converted into a percentage by dividing the duration the

individual engaged in gaze aversion by the total duration of the interview and multiplying by 100% (see Appendix Q).

Repetitive body movements. A repetitive body movement was operationalised as any body movement or use of object that (1) was not required to meet the demands of the interview or did not appear to serve a functional purpose, and (2) was displayed more than once within the duration of the interview. Examples included running their hand through their hair multiple times, tapping their foot repeatedly, twirling a pen repeatedly, or scratching their face multiple times. Non-examples included swatting a fly, sneezing, shifting once to be more comfortable, scratching their face once, or gesturing to illustrate a point to the interviewer.

The interview was broken down into five-second intervals. If the target individual engaged in a repetitive behaviour at any time during that five-second period, we recorded the intensity of the behaviour on a 3-point scale ranging from 1 (*subtle*) to 3 (*intense/ distracting*). As specified in the coding guidelines, we made the lower (i.e., more socially appropriate) rating if we were unable to decide between two ratings (see Appendix Q). Each interval in which the behaviour was displayed was counted as one instance of repetitive body movement, regardless of how many times the behaviour occurred within that interval. If the behaviour occurred at different intensities within the same five-second interval, the highest intensity rating was recorded.

We observed and coded all subsequent five-second intervals in the same way. To account for the varying lengths of the interviews and the varying intensities of the behaviour, an overall score was calculated by dividing the total intensity score (i.e., the sum of all intensity ratings) by the maximum intensity score (i.e., the total number of intervals multiplied by three). This number was then converted into a percentage by multiplying by 100%.

Literal interpretation of figurative language. Literal interpretation of figurative language was operationally defined as having difficulty understanding the figurative meaning of the phrase "fishy" that was intended by the interviewer in the question, "Did you see anything at all that was *fishy* while you were in the room?" The figurative meaning of the phrase "fishy" that was intended by the interviewer was "creating doubt or suspicion." Given that only one question in the interview contained figurative language, this behaviour was marked on a dichotomous measure in which we specified whether the behaviour was present or absent (see Appendix Q). To assist in the identification of the behaviour, a picture of a coral reef was set as the desktop of the computer that was used for the computer task prior to the interview. Any response that made reference to the fish in this image was coded as literal interpretation of figurative language.

Poor reciprocity. Poor reciprocity was operationally defined as providing a response that either (1) was irrelevant to the question asked by the interviewer, or (2) did not fully answer the question asked by the interviewer. Irrelevant responses that were due to difficulty understanding figurative language were not coded under poor reciprocity. We observed and recorded the timestamp of the video at the start and end of each interval the individual demonstrated the behaviour. The behaviour ended when either of the following occurred: (1) the individual shifted to providing information that was relevant to the question asked by the interviewer, or (2) the individual stopped talking to allow the interviewer to speak. A measure of poor reciprocity was obtained by calculating the total duration the behaviour was displayed. To account for the varying lengths of the interviews, this was then converted into a percentage by dividing the duration the individual engaged in the behaviour by the total duration of the interview and multiplying by 100% (see Appendix Q).

Flat affect. Flat affect was measured using a measure of emotional expression. Emotional expression was operationally defined as the individual speaking with appropriate

expression of emotion (i.e., varied their tone, volume, and timing of speech where necessary, and used expressive gestures and facial expressions) throughout the interview. Given that emotional expression comprises a variety of different aspects and that the focus was on the appropriateness of the behaviour (as opposed to simply the presence of the behaviour), it was difficult to obtain an objective measure of emotional expression. Therefore, a 3-point behaviourally anchored rating scale (BARS) was used instead (see Appendix Q). Each point on the BARS was accompanied by a behavioural description that defined the level of the characteristic being rated, thus minimising subjective interpretation of the scale and allowing for greater consistency between different coders.

We observed the individual's emotional expression across the entire interview and provided a single rating on the BARS, with responses ranging from 1 (*The individual spoke with no expression of emotion [i.e., they spoke in a monotone, they spoke slowly and softly, and did not use body language, expressive gestures, or facial expressions]*) to 3 (*The individual spoke with appropriate expression of emotion [i.e., varied their tone, volume, and timing of speech where necessary, and used expressive gestures and facial expressions]*). We made the higher (i.e., more socially appropriate) rating if we were unable to decide between two ratings. These ratings were then reverse-scored to obtain a measure of flat affect.

Inter-rater reliability. Inter-rater reliability for the coding of gaze aversion, repetitive body movements, and poor reciprocity was assessed using three separate two-way random, consistency, single-measures intraclass correlations (ICC), while inter-rater reliability for the coding of literal interpretation of figurative language and flat affect was assessed using Cohen's kappa (κ) and linearly weighted Cohen's kappa (κ_w), respectively. Inter-rater reliability was found to be high for the coding of gaze aversion (ICC = .88),

repetitive body movements (ICC = .87), and literal interpretation of figurative language (κ = .82), but poor for the coding of poor reciprocity (ICC = .51) and flat affect (κ_w = .45)[39].

Upon review of the data, it was found that ratings of poor reciprocity differed between the two coders on 21 of the 59 videos, while ratings of flat affect differed on six of the 59 videos. To reconcile these discrepancies, a clinician with extensive experience working with ASD individuals was recruited. The clinician observed and recorded the level of poor reciprocity or flat affect displayed in each video using the same operationalisations and coding guidelines previously employed. In instances where the discrepancy occurred solely as a result of differences in the timestamps recorded at the start and end of the behaviour, the mean duration was used. Remaining disagreements in the coding of the target behaviours were then discussed until a consensus was reached.

Clinical Impression

Given that the deficits in social communication and interaction, and restricted and repetitive behaviours and interests that characterise ASD can manifest in a variety of ways, it was acknowledged that the behavioural analysis was unable to capture the full range of atypical behaviours displayed by ASD individuals. It is possible that judgments of deception and credibility may be influenced by the presence of other ASD behaviours that were not accounted for, or by the overall presentation of the individual as having a disorder. Therefore, to examine this possibility, a measure of the general impression of each target individual was also obtained.

[39] A review of the data suggested that the weighted Cohen's kappa coefficient obtained for ratings of flat affect may have been unduly influenced by the imbalanced distribution of scores, a phenomenon known as the "kappa paradox" (Feinstein & Cicchetti, 1990). Inter-rater reliability using Gwet's AC1 was .90 (see Gwet, 2008; Wongpakaran, Wongpakaran, Wedding, & Gwet, 2013). Nonetheless, discrepancies in the coding of flat affect were still discussed until a consensus was reached.

To do so, six provisional psychologists[40] from Flinders University (three female) were recruited. They ranged in age from 24 to 43 years (M = 29.50, SD = 6.53) and were at varying stages of their clinical training to obtain registration with the Psychology Board of Australia. All six individuals were not involved in any other aspect of this project and were blind to both the purpose of the study and group membership of the target individuals. The provisional psychologists were asked to independently watch each stimulus video and indicate the likelihood that the person in the video had ASD on a 7-point Likert scale ranging from 1 (*extremely unlikely*) to 7 (*extremely likely*). To ensure that the raters remained blind to the purpose of the study, they were also asked to do the same for nine other disorders (anxiety disorder, bipolar disorder, intellectual disability, language disorder, mood disorder, obsessive-compulsive disorder, personality disorder, post-traumatic stress disorder, and schizophrenia); however, these ratings were not used as part of the data analysis. Finally, raters were asked to provide an overall rating of the likelihood that the person in the video had any mental health or developmental disorder using the same scale (see Appendix R). The order of presentation of the videos was randomised for each rater. For each rating, raters were also asked to indicate how confident they were in their decision, on a scale of 0 (*not at all confident*) to 100 (*highly confident*). On average, raters were 62.35% (SD = 23.15) confident in their impression of whether the individuals had ASD and 63.62% (SD = 21.83) confident in their impression of whether the individuals had any disorder.

[40] In Australia, provisional registration with the Psychology Board of Australia is granted when an individual has completed an accredited four-year sequence of study and is currently enrolled in a supervised practice pathway to obtain general registration as a psychologist. The provisional psychologists involved in this project were all enrolled in an accredited Masters of Clinical Psychology or PhD (Clinical Psychology) program at Flinders University.

Method

Participants and Design

Haphazard sampling was used to recruit 1726 participants via the online crowdsourcing platform TurkPrime (Litman et al., 2017). The data from 316 participants were excluded from the analysis (116 participants failed to pass attention checks, 56 participants proceeded to the next page of the online survey before the duration of the video was over, 137 participants completed the task in less than one third of the median duration, and seven participants experienced technical difficulties).[41] The final sample consisted of 1410 participants (853 female), ranging in age from 18 to over 85 years (M = 41.13, SD = 11.48, Mdn = 39.32). Of these, 1369 participants spoke English as their first language, and 197 participants were fluent in more than one language.

A between-subjects design was applied, such that each participant was randomly allocated to view only one of the 59 stimulus videos and to complete only one measure of either the target individual's truthfulness (n = 713) or credibility (n = 697). A priori sample size estimations using G*Power 3.1 (Faul et al., 2007) indicated that a minimum sample of 725 participants would be required to detect a small effect (f^2 = .02) at an alpha level of .05 and power of .80 in a multiple regression model with seven predictor variables. The dependent variable for this study was perception of the target individual.

Materials and Procedure

The 59 videos that were developed were used as stimulus materials in the present experiment. The procedure and all other materials were identical to those used in Experiment 4.

[41] The data exclusion criteria were determined a priori.

Results

Descriptive Statistics

The results of the behavioural analysis and ratings of clinical impression for each group are presented in Table 25.

Table 25

Behavioural Coding of ASD Behaviours and Ratings of Clinical Impression[42]

ASD Behaviour/ Clinical Impression	ASD (n = 30)		Neurotypical (n = 29)	
	M	*SD*	*M*	*SD*
Gaze Aversion	35.39	13.73	29.31	11.36
Repetitive Body Movements	23.51	10.18	21.59	13.25
Poor Reciprocity	1.79	3.42	0.80	1.98
Clinical Impression (ASD)	3.15	1.01	2.11	0.64
Clinical Impression (Any Disorder)	4.21	0.96	2.93	0.64
ASD Behaviour	ASD (n = 30)		Neurotypical (n = 29)	
	No. of Individuals		No. of Individuals	
Literal Interpretation of Figurative Language	5		1	
Flat Affect[43]	5		3	

Mean ratings of perceived deception and credibility for each group are presented in Table 26.

[42] Gaze aversion, repetitive body movements, and poor reciprocity were measured by percentage of time the behaviour was displayed (see Appendix Q). Clinical impression of ASD and clinical impression of any disorder were measured on 7-point Likert scales ranging from 1 (*extremely unlikely*) to 7 (*extremely likely*; see Appendix R). The number of individuals who were coded as displaying literal interpretation of figurative language and flat affect are also presented.

[43] None of the individuals were coded as displaying no emotional expression. Thus, only the number of individuals who were coded as displaying minimal emotional expression is presented.

Table 26

Mean Ratings of Perceived Deception and Credibility by ASD Diagnosis[44]

Measure	ASD (*n* = 30)		Neurotypical (*n* = 29)	
	M	*SD*	*M*	*SD*
Perceived Deception	8.35	3.60	7.48	3.77
Perceived Competence	22.15	5.78	24.67	4.90
Perceived Caring	11.79	3.45	12.40	3.65
Perceived Character	25.73	8.29	27.69	7.50

Hypothesis Testing

As it is highly unlikely that there is only one variable that influences the relationship between a predictor and an outcome, Preacher and Hayes (2008) advise that hypotheses involving multiple potential mediators should be considered. They recommend that when multiple mediators are involved, a multiple mediation approach (in which all mediators are included in the same model) is the most parsimonious and precise way to analyse the data (Preacher & Hayes, 2008).[45] Because the predictor (ASD diagnosis) and mediators (gaze aversion, repetitive body movements, literal interpretation of figurative language, poor reciprocity, flat affect, and clinical impression of any disorder[46]) were measured at the video level (level 2), while the outcome variables (perceived deception, competence, caring, and character) were measured at the participant level (level 1), 2-2-1 multilevel mediation

[44] The mean ratings presented are based on disaggregated data. Ratings of perceived deception were reverse-scored such that higher scores indicate higher levels of perceived deception (on a scale ranging from 2 to 12). Perceived competence was measured on a scale ranging from 5 to 35 (with higher scores indicating higher levels of perceived competence), while ratings of perceived caring ranged from 3 to 21, and ratings of perceived character ranged from 6 to 42.

[45] However, to better illustrate how the strength of each mediator differed upon the inclusion of other mediators in the model, multilevel mediation analyses for each individual mediator are also presented in Appendix S.

[46] When all mediators were included in the model, there was high multicollinearity for clinical impression of ASD (VIF = 4.11) and clinical impression of any disorder (VIF = 3.64). Thus, only clinical impression of any disorder was retained in the data analysis.

analyses were used to test the model shown in Figure 14 using the multilevel structural equation modelling (MSEM) framework outlined by Preacher, Zyphur, and Zhang (2010). Each outcome variable was examined separately. The analyses were carried out using maximum likelihood with robust standard errors estimators (MLR) in Mplus Version 8.

It was noted that none of the target individuals displayed high levels of flat affect in the interviews and were only coded as demonstrating either minimal emotional expression (n = 8) or appropriate emotional expression (n = 51). This resulted in a highly disproportionate binary outcome. Consequently, when flat affect was included in the model, the standard errors of the model parameters could not be reliably estimated. Therefore, for the purpose of hypothesis testing, flat affect was excluded from the overall model.[47] The results of the analysis are summarised in Table 27.

The relationship between ASD diagnosis and perceived deception and credibility. It was hypothesised that ASD individuals would be perceived as more deceptive and less credible compared to neurotypical individuals. The results revealed that there was a significant total effect (c) of ASD diagnosis on perceived deception, competence, and character. There was also a significant direct effect (c') of ASD diagnosis on perceived deception after controlling for all other variables in the model. However, ASD diagnosis did not appear to have any significant effect on ratings of perceived caring.

The relationship between ASD diagnosis and ASD behaviours. Contrary to the hypothesis, ASD diagnosis did not significantly predict levels of gaze aversion, repetitive body movements, literal interpretation of figurative language, or poor reciprocity (a_1-a_4). However, ASD diagnosis was a significant predictor of clinical impression of having a disorder (a_5).

[47] For comparison, the results of the analysis when flat affect was included as a mediator in the model are presented in Appendix T. The relationship between flat affect and each of the four outcome variables were not statistically significant, nor was the mediation analysis of the relationship between ASD diagnosis and perceived deception and credibility through flat affect.

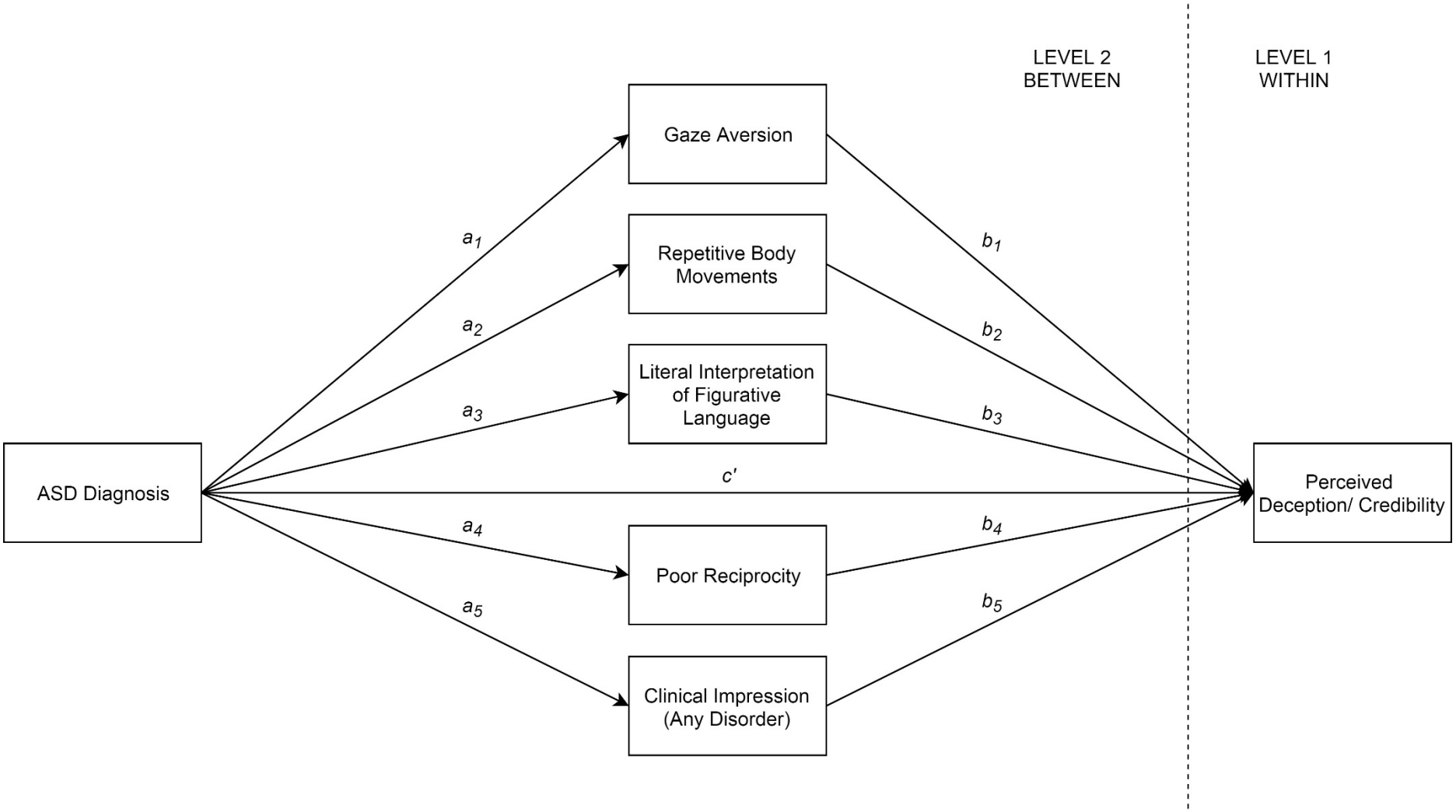

Figure 14. 2-2-1 multilevel mediation model between ASD diagnosis, ASD behaviours, and perceived deception or credibility.

Table 27

Multilevel Mediation Models between ASD Diagnosis, ASD Behaviours, and Perceived Deception and Credibility

	Perceived Deception		Perceived Competence		Perceived Caring		Perceived Character	
	Estimate	95% CI	Estimate	95% CI	Estimate	95% CI	Estimate	95% CI
Total Effect								
ASD Diagnosis (*c*)	**0.86****	**0.39, 1.33**	**-2.49*****	**-3.54, -1.44**	-0.59	-1.18, 0.01	**-1.91***	**-3.33, -0.48**
Direct Effects								
ASD Diagnosis (*c'*)	**0.71***	**0.14, 1.29**	-0.82	-2.14, 0.50	0.01	-0.70, 0.72	0.32	-1.49, 2.13
Mediators on ASD Diagnosis:								
Gaze Aversion (a_1)	6.07	0.77, 11.37	6.07	0.77, 11.37	6.07	0.77, 11.37	6.07	0.77, 11.37
Repetitive Body Movements (a_2)	1.92	-3.06, 6.90	1.92	-3.06, 6.90	1.92	-3.06, 6.90	1.92	-3.06, 6.90
Literal Interpretation (a_3)	0.13	0.01, 0.26	0.13	0.01, 0.26	0.13	0.01, 0.26	0.13	0.01, 0.26
Poor Reciprocity (a_4)	1.00	-0.18, 2.17	1.00	-0.18, 2.17	1.00	-0.18, 2.17	1.00	-0.18, 2.17
Clinical Impression (a_5)	**1.29*****	**0.94, 1.63**	**1.29*****	**0.94, 1.63**	**1.29*****	**0.94, 1.63**	**1.29*****	**0.94, 1.63**
Outcome on Mediators:								
Gaze Aversion (b_1)	-0.01	-0.03, 0.02	-0.004	-0.05, 0.04	-0.01	-0.03, 0.01	-0.01	-0.06, 0.04
Repetitive Body Movements (b_2)	-0.02	-0.04, -0.001	-0.03	-0.07, 0.003	0.02	-0.002, 0.05	-0.01	-0.06, 0.04
Literal Interpretation (b_3)	-0.07	-0.60, 0.46	0.94	-0.64, 2.53	0.69	-0.07, 1.44	1.79	-0.22, 3.80
Poor Reciprocity (b_4)	**-0.11****	**-0.17, -0.04**	-0.07	-0.25, 0.11	-0.03	-0.09, 0.04	-0.12	-0.26, 0.03
Clinical Impression (b_5)	0.27	-0.02, 0.55	**-1.28****	**-2.01, -0.54**	**-0.51****	**-0.83, -0.19**	**-1.75*****	**-2.58, -0.92**
Indirect Effects								
Total Indirect Effect (*ab*)	0.15	-0.27, 0.57	**-1.67***	**-2.83, -0.51**	-0.60	-1.10, -0.09	**-2.22****	**-3.52, -0.93**
Gaze Aversion (a_1b_1)	-0.03	-0.16, 0.10	-0.02	-0.27, 0.23	-0.05	-0.18, 0.09	-0.07	-0.38, 0.23
Repetitive Body Movements (a_2b_2)	-0.04	-0.16, 0.07	-0.06	-0.24, 0.12	0.04	-0.09, 0.17	-0.03	-0.14, 0.09
Literal Interpretation (a_3b_3)	-0.01	-0.08, 0.06	0.13	-0.13, 0.38	0.09	-0.06, 0.24	0.24	-0.18, 0.66
Poor Reciprocity (a_4b_4)	-0.11	-0.23, 0.02	-0.07	-0.26, 0.12	-0.03	-0.10, 0.04	-0.12	-0.30, 0.07
Clinical Impression (a_5b_5)	0.34	-0.04, 0.73	**-1.64***	**-2.77, -0.51**	**-0.65***	**-1.10, -0.21**	**-2.25****	**-3.43, -1.07**
Indices of Model Fit	RMSEA = .04, CFI = .81, TLI = .60		RMSEA = .04, CFI = .85, TLI = .68		RMSEA = .04, CFI = .82, TLI = .63		RMSEA = .04, CFI = .84, TLI = .66	

Note. RMSEA = root mean square error of approximation; CFI = comparison fit index; TLI = Tucker-Lewis index. Estimates that are significant at the .05 level are indicated in bold.

*$p \leq .05$, **$p \leq .01$, ***$p \leq .001$

The relationship between ASD behaviours and perceived deception and credibility. Poor reciprocity (b_3) was found to be a significant predictor of perceived deception but not in the expected direction: the higher the level of poor reciprocity displayed by the target individual, the *less* deceptive they were perceived to be. There was no significant association between any of the target ASD behaviours and perceived competence, caring, or character (b_1-b_4), but overall presentation as having a disorder negatively predicted ratings of perceived competence, caring, and character (b_5).

Mediation of the relationship between ASD diagnosis and perceived deception and credibility. The mediation analysis of the relationship between ASD diagnosis and perceived competence, caring, and character through clinical impression (a_5b_5) was found to be statistically significant. However, none of the other mediation pathways illustrated in Figure 14 were statistically significant.

Participant-Reported Cues Indicative of Deception and Non-Credibility

After indicating their impression of the target individual's truthfulness or credibility, participants were asked to provide a brief explanation of the reasons for their rating (participants were encouraged to state "unsure" if they were uncertain). The participants' qualitative responses were then analysed, and the number of participants who reported using each of the target ASD behaviours as a cue to deception or credibility was recorded. Given that participants provided open-ended responses, it was possible for participants to indicate the use of more than one cue. Other commonly reported cues included hesitation, smiling, and a change from baseline demeanour, and the number of participants who reported using each of these cues was also calculated. Responses that did not include any of the eight listed behaviours were classified under "others" (see Table 28).[48]

[48] To ensure the reliability of the analysis, a research assistant also independently coded 20% of the data (n = 282). Inter-rater reliability using Cohen's kappa (κ) ranged from .38 to 1 (see Appendix U). However, a review of the data suggested that the values of Cohen's kappa obtained may have been unduly influenced by the

Table 28

Participant-Reported Cues Indicative of Deception and Non-Credibility

Behavioural Cue	Deception (*n* = 713)		Credibility (*n* = 697)	
	n	%	*n*	%
Gaze Aversion	202	28.33	111	15.93
Repetitive Body Movements	108	15.15	67	9.61
Literal Interpretation of Figurative Language	2	0.28	2	0.29
Poor Reciprocity	33	4.63	13	1.87
Flat Affect	3	0.42	4	0.57
Hesitation	57	7.99	37	5.31
Smiling/ Smirking/ Laughing	85	11.92	48	6.89
Inconsistent Demeanour	98	13.74	38	5.45
Others	237	33.24	375	53.80
Unsure	56	7.85	93	13.34

Knowledge of ASD Diagnosis

Using the same multilevel mediation approach previously described, I then examined the relationship between ASD diagnosis, ASD behaviours, and ratings of deception and credibility after participants had been told that the target individuals may have ASD. The results revealed that there was no longer a significant total effect of ASD diagnosis on perceived deception or character; however, ASD diagnosis continued to affect ratings of perceived competence through overall clinical impression (see Table 29). Therefore, to examine the interaction effect of ASD diagnosis and knowledge of ASD diagnosis on

imbalanced distribution of scores, a phenomenon known as the “kappa paradox” (Feinstein & Cicchetti, 1990). Inter-rater reliability using Gwet’s AC1 ranged from .94 to 1 (see Gwet, 2008; Wongpakaran et al., 2013).

Table 29

Multilevel Mediation Models between ASD Diagnosis, ASD Behaviours, and Perceived Deception and Credibility (with Knowledge of ASD)

	Perceived Deception		Perceived Competence		Perceived Caring		Perceived Character	
	Estimate	95% CI	Estimate	95% CI	Estimate	95% CI	Estimate	95% CI
Total Effect								
ASD Diagnosis (*c*)	0.20	-0.21, 0.60	**-1.57*** **	**-2.35, -0.79**	-0.39	-0.88, 0.10	-0.48	-1.41, 0.46
Direct Effects								
ASD Diagnosis (*c'*)	0.25	-0.27, 0.76	-0.37	-1.36, 0.62	0.11	-0.57, 0.79	0.20	-1.10, 1.50
Mediators on ASD Diagnosis:								
Gaze Aversion (a_1)	6.07	0.77, 11.37	6.07	0.77, 11.37	6.07	0.77, 11.37	6.07	0.77, 11.37
Repetitive Body Movements (a_2)	1.92	-3.06, 6.90	1.92	-3.06, 6.90	1.92	-3.06, 6.90	1.92	-3.06, 6.90
Literal Interpretation (a_3)	0.13	0.01, 0.26	0.13	0.01, 0.26	0.13	0.01, 0.26	0.13	0.01, 0.26
Poor Reciprocity (a_4)	1.00	-0.18, 2.17	1.00	-0.18, 2.17	1.00	-0.18, 2.17	1.00	-0.18, 2.17
Clinical Impression (a_5)	**1.29*** **	**0.94, 1.63**	**1.29*** **	**0.94, 1.63**	**1.29*** **	**0.94, 1.63**	**1.29*** **	**0.94, 1.63**
Outcome on Mediators:								
Gaze Aversion (b_1)	-0.01	-0.02, 0.01	0.01	-0.02, 0.04	0.01	-0.01, 0.03	0.02	-0.02, 0.06
Repetitive Body Movements (b_2)	-0.01	-0.03, 0.01	-0.01	-0.04, 0.02	0.01	-0.02, 0.03	-0.03	-0.07, 0.01
Literal Interpretation (b_3)	-0.39	-0.81, 0.03	-0.19	-1.65, 1.27	0.70	-0.24, 1.63	0.72	-0.65, 2.08
Poor Reciprocity (b_4)	**-0.15*** **	**-0.21, -0.08**	-0.09	-0.21, 0.03	-0.01	-0.11, 0.09	-0.15	-0.32, 0.02
Clinical Impression (b_5)	0.16	-0.09, 0.41	**-0.87** **	**-1.36, -0.38**	**-0.50** **	**-0.82, -0.19**	-0.53	-1.21, 0.15
Indirect Effects								
Total Indirect Effect (*ab*)	-0.05	-0.49, 0.39	**-1.20** **	**-1.94, -0.45**	-0.50	-0.96, -0.04	-0.68	-1.51, 0.16
Gaze Aversion (a_1b_1)	-0.03	-0.15, 0.08	0.05	-0.14, 0.25	0.05	-0.07, 0.16	0.11	-0.14, 0.37
Repetitive Body Movements (a_2b_2)	-0.02	-0.09, 0.05	-0.02	-0.09, 0.05	0.02	-0.05, 0.08	-0.06	-0.20, 0.09
Literal Interpretation (a_3b_3)	-0.05	-0.11, 0.01	-0.03	-0.22, 0.16	0.09	-0.09, 0.27	0.10	-0.12, 0.31
Poor Reciprocity (a_4b_4)	-0.15	-0.34, 0.05	-0.09	-0.23, 0.05	-0.01	-0.10, 0.09	-0.15	-0.30, 0.01
Clinical Impression (a_5b_5)	0.20	-0.11, 0.52	**-1.12***	**-1.87, -0.36**	**-0.65** **	**-1.06, -0.24**	-0.68	-1.55, 0.18
Indices of Model Fit	RMSEA = .04, CFI = .78, TLI = .53		RMSEA = .04, CFI = .82, TLI = .63		RMSEA = .04, CFI = .77, TLI = .51		RMSEA = .04, CFI = .75, TLI = .47	

Note. RMSEA = root mean square error of approximation; CFI = comparison fit index; TLI = Tucker-Lewis index. Estimates that are significant at the .05 level are indicated in bold.

*$p \leq .05$, **$p \leq .01$, ***$p \leq .001$

judgments of deception and credibility, I aggregated ratings of perceived deception, competence, caring, and character according to the target individual in the stimulus video (N = 59). I then conducted four two-way mixed ANOVAs, with ASD diagnosis and knowledge of ASD diagnosis as the independent variables, and ratings of perceived deception, competence, caring, and character as the dependent variables, respectively.[49]

The results revealed a significant interaction effect of ASD diagnosis and knowledge of ASD diagnosis on ratings of perceived deception [$F(1, 57) = 9.12$, $p = .004$, $\eta_p^2 = .14$, 90% CI = .03, .27] and character [$F(1, 57) = 6.15$, $p = .05$, $\eta_p^2 = .10$, 90% CI = .01, .23]. However, there was no significant interaction effect of ASD diagnosis and knowledge of ASD diagnosis on ratings of perceived competence [$F(1, 57) = 5.19$, $p = .08$, $\eta_p^2 = .08$, 90% CI = .01, .21] or caring [$F(1, 57) = 0.34$, $p = 1$, $\eta_p^2 = .01$].

Discussion

The findings of the present study revealed that ASD individuals were rated higher on perceived deception and lower on perceived competence and character compared to neurotypical individuals. Although these effects were small,[50] to the best of my knowledge, this experiment is among the first to provide empirical evidence for the existence of such a relationship. There was no difference in ratings of perceived caring between the two groups.

The Relationship between ASD Diagnosis and ASD Behaviours

In line with ASD diagnostic criteria, research has demonstrated that ASD individuals display higher levels of gaze aversion (Doherty-Sneddon et al., 2013), repetitive body movements (Morgan et al., 2008), literal interpretation of figurative language (Chouinard & Cummine, 2016), poor reciprocity (Bauminger-Zviely, Karin, Kimhi, & Agam-Ben-Artzi,

[49] Bonferroni correction was applied to the analysis of the three domains of credibility.
[50] As indicated by the regression coefficient of the *c* pathway, the mean rating of perceived deception for the ASD group was 0.86 points higher than that of the neurotypical group, on a scale ranging from 2 to 12. Likewise, the mean rating of perceived competence was 2.49 points lower for the ASD group than the neurotypical group (on a scale ranging from 5 to 35), and the mean rating of perceived character was 1.91 points lower for the ASD group than the neurotypical group (on a scale ranging from 6 to 42).

2014), and flat affect (Stagg et al., 2014) compared to their neurotypical peers. However, these differences were not reflected in the present sample, as it was found that ASD diagnosis did not significantly predict any of the target ASD behaviours.

There are several possible explanations for this finding. Firstly, due to the nature of the task, most of the ASD individuals involved in the present experiment appeared to be high-functioning individuals. Although no objective measurements of adaptive functioning were taken, the behaviours observed during the session were consistent with the Level 1 severity specifier detailed in the DSM-5: (1) as demonstrated by their participation in the interview, all individuals were able to speak in full sentences and engage in conversation with the interviewer, and (2) within the duration of the session, none of the ASD individuals demonstrated inflexible or restricted patterns of behaviour that were readily observed by the researchers (American Psychiatric Association, 2013). Thus, it is possible that this sample was not sufficiently representative of the ASD population as a whole and did not entirely reflect the varying degrees to which these behaviours are displayed in the population.

In addition, anecdotal observations of the ASD targets in the present experiment also suggested that the videos produced may not have fully captured the extent to which these individuals would display the target behaviours in everyday social interactions. It was observed throughout the course of the sessions that when the researchers engaged the ASD individuals in unstructured conversation (e.g., when introducing themselves, explaining the purpose and procedure of the session), they frequently displayed poor eye contact and poor reciprocity. For example, when I was explaining the task, one ASD individual responded by describing in great detail an incident from childhood when he had lied to his teacher, while another individual continued to talk about his volunteering experience when I was trying to provide him directions on how to return to the carpark.

In contrast to these anecdotal observations, the majority of the ASD individuals who displayed poor reciprocity in the interviews only did so for relatively short periods of time. I speculated that this discrepancy may have been due to the high level of structure inherent in the interview process, which only required the individuals to respond to questions from the interviewer and not to maintain spontaneous two-way conversation. Jones and Schwartz (2009) propose that while ASD individuals are able to attend and respond to questions from others, they exhibit deficits in engaging in the social nature of conversational discourse. Although these deficits would likely stand out in a typical social interaction, the nature of the interview used in the present study was such that providing answers to the interviewer's questions was all that was required. Therefore, it is possible that the social demands of the interview were relatively low and failed to highlight the communicative difficulties experienced by ASD individuals.

However, when ratings of gaze aversion, repetitive body movements, and poor reciprocity were aggregated to obtain an overall measure of ASD behaviour, ASD diagnosis was found to be a significant predictor of this composite score. This may reflect the fact that ASD occurs on a spectrum, and the way in which symptoms manifest can vary from person to person. Furthermore, ASD diagnosis was also found to be a significant predictor of clinical impression of having a disorder. Though it is unclear exactly what factors led to this impression, this provides further support that there were, in fact, noticeable differences in the presentation of the ASD individuals that distinguished them from neurotypical controls.

The Relationship between ASD Behaviours and Perceived Deception and Credibility

In accordance with past research and the findings of Experiments 1 to 4, it was hypothesised that gaze aversion, repetitive body movements, literal interpretation of figurative language, poor reciprocity, and flat affect would lead to increased judgments of

deception and non-credibility. However, the results revealed no significant effect of any of the target behaviours on judgments of credibility.

In Experiments 1 to 4, the stimulus videos presented an individual who either displayed the target behaviour at a high intensity or not at all. Even when comparisons were being made between these two extreme ends of the spectrum, the effects of ASD behaviours on judgments of deception and credibility were small[51] and were not reliably detected within the sample sizes available for each experiment. In contrast, the ASD behaviours displayed in the present stimulus videos were much more subtle and did not cover as broad a range of intensity (see Table 30).

Table 30

Levels of ASD Behaviours Displayed in Experiment 4 and Experiment 5 (% of Time)[52]

	Experiment 4				
	n	Min	Max	*M*	*SD*
Gaze Aversion	6	96.30	100.00	98.31	1.51
Repetitive Body Movements	6	65.33	100.00	79.45	16.30
Poor Reciprocity	6	35.12	44.13	38.90	2.96
	Experiment 5				
	n[53]	Min	Max	*M*	*SD*
Gaze Aversion	59	5.66	70.00	32.40	12.88
Repetitive Body Movements	58	3.33	58.33	22.96	11.44
Poor Reciprocity	20	0.86	14.74	3.84	3.67

[51] The meta-analysis of Experiments 1 to 4 revealed effect sizes (*r*) that ranged from .11 to .30.
[52] As literal interpretation of figurative language and flat affect were coded using categorical measures, it was not possible to identify any differences in the level of behaviour displayed.
[53] Individuals who did not demonstrate the target behaviour at all were not included in the analysis.

For example, when the same behavioural coding guidelines were used to analyse the stimulus videos from Experiment 4, the six target individuals in the gaze aversion condition were found to have displayed gaze aversion for (on average) 98.31% of the interview. By comparison, the highest level of gaze aversion displayed by any of the target individuals in the present experiment was only 70% and a score of 51.72% was 1.5 standard deviations above the mean (only five individuals displayed gaze aversion that was equal to or above this level). Thus, it is likely that the effects of ASD behaviours on perceived deception and credibility were not strong enough to be detected within the current experimental paradigm. Taken together, the findings of this project consistently indicate that the effects of ASD behaviours on judgments of deception and credibility are relatively weak.

In addition, contrary to the hypothesis, poor reciprocity and overall ASD behaviour were found to be associated with a *decrease* in ratings of perceived deception in the present experiment. This finding may also be due to differences in the way poor reciprocity was presented in the current experiment as opposed to previous experiments. In Experiment 4, the target individuals in the poor reciprocity condition responded with an extensive narrative about palm trees when questioned about what they did in the lab. This was designed to portray the tendency of ASD individuals to miss the intention of their conversation partner and to direct the conversation toward their restricted interests (Dean et al., 2013; Sng, Carter, & Stephenson, 2018). While this depiction of poor reciprocity was one that was clearly evident, instances of poor reciprocity in the present stimulus videos were less overtly tangential. For example, in response to the question, “Did you see anyone take money from the envelope?” one individual responded, “I don’t know if there was actually money in there to begin with.” This response was coded as poor reciprocity as it did not address the interviewer’s intended question. However, it is possible that statements such as these were viewed by participants as detailed (rather than tangential) responses. There is evidence to

suggest the existence of a belief that individuals provide more details (Bogaard et al., 2016), specifically, more unusual details (Bogaard & Meijer, 2018), when telling the truth compared to when lying. Thus, it may be that individuals who were coded as displaying poor reciprocity were judged as less deceptive because they appeared to provide more unusual details.

Mediation of the Relationship between ASD Diagnosis and Perceived Deception and Credibility

It was hypothesised that ASD individuals would be perceived as more deceptive and less credible than neurotypical individuals, and that this relationship would be mediated by the extent to which individuals displayed the target ASD behaviours. However, none of the mediation models of the relationship between ASD diagnosis, ASD behaviours, and perceived deception and credibility were found to be statistically significant. Instead, the only mediation pathways in the models that were statistically significant were that of the relationship between ASD diagnosis and perceived competence, caring, and character through clinical impression of having a disorder. At this stage, it remains unknown what factors contributed to this clinical impression and why these then, in turn, were negatively correlated with perceptions of credibility. It is possible that clinical impression is influenced by the demonstration of other characteristic ASD behaviours that were not coded for in the current experiment. Alternatively, and perhaps more likely, it may be that there are nuances in the speech and mannerisms of ASD individuals that distinguish them from neurotypical individuals and negatively influence perceptions of credibility. Nevertheless, this finding is consistent with the findings of Levine et al. (2000) and Bond et al. (1992) that observers infer deception from behaviours that are aberrant or “fishy-looking.”

No statistically significant mediation pathways were found for the relationship between ASD diagnosis and perceived deception. Instead, there was a significant direct effect

of ASD diagnosis on perceived deception after controlling for ASD behaviours and clinical impression. This once again suggests that there are likely other factors that were not accounted for in the present experiment that contribute to this relationship.

Participant-Reported Cues Indicative of Deception and Non-Credibility

Participants' qualitative responses of the reasons for their impression revealed that gaze aversion was the most frequently cited behavioural cue used in inferring both the truthfulness (28.33%) and credibility (15.93%) of the target individuals. However, despite this, gaze aversion was not found to be a significant predictor of perceived deception or credibility after controlling for other ASD behaviours. The large variability in participant-reported cues (particularly within responses classified under "other") suggests that there are many different behaviours that people perceive to be indicative of deception and non-credibility. It was also noted that many participants did not report the use of specific behavioural cues, but rather, referred to broad presentations (e.g., "he seemed very nervous," "he looked relaxed," "she felt uncomfortable at times," "she carried a calm yet confident composure," "he seemed a little paranoid," "body language seemed off") or their gut-feeling about the individual (e.g., "she seems like a really nice girl," "she seemed honest," "he seemed like a genuine guy," "she looked very simple and not very eloquent," "she seemed a bit cocky and self-interested"). These responses suggest that participants may not have been fully aware of the specific factors that influenced their judgments.

Knowledge of ASD Diagnosis

Attribution theories (Kelley & Michela, 1980) propose that while behaviours that are normative or expected are accepted at face value, behaviours that are atypical or unexpected demand an explanation. When no obvious explanations are available, individuals begin to search for reasons to which the behaviour could be attributed, such as deception and non-credibility. Based on this premise, it can be expected that if an explanation for the behaviour

was available, there would be no need to attribute the behaviour to deception or non-credibility. To test this hypothesis, participants in the present experiment were asked to rate their perceptions of the target individual again after being told that the individual may have a diagnosis of ASD.

As predicted, informing participants that the target individuals may have ASD negated the effect of ASD diagnosis on perceived deception and character; that is, there was no longer a difference in ratings of perceived deception and character between ASD individuals and neurotypical individuals. However, ASD diagnosis continued to negatively affect ratings of perceived competence. This is consistent with the findings of Experiment 4, whereby informing participants that the target individuals may have ASD did not change their perceptions of the individuals' level of competence. The description of ASD provided to participants highlighted that "characteristics of ASD include difficulties with social interaction and nonverbal communication, repetitive behaviours, and restricted interests." Although this reflects DSM-5 diagnostic criteria (American Psychiatric Association, 2013), inherent in this statement is the fact that ASD individuals experience impairments in certain areas of functioning. It may be that defining ASD in this manner primed participants to think of ASD individuals in terms of what they *can't* do, thus resulting in lower ratings of perceived competence relative to neurotypical individuals.

Limitations

While effort was made to control for as many variables as possible, there were undoubtedly factors that were not taken into consideration that could have influenced the participants' judgments of deception and credibility. For example, no dress code was specified for the interviews, and consequently, the target individuals varied considerably with regard to grooming and appearance. Anecdotal observations suggest that other possible confounding variables include the target individuals' prosody, facial expressions, and

hesitations. In addition, because the target individuals responded to all interview questions truthfully and spontaneously, there were also slight differences in the verbal content of each individual's response. However, because the demonstration of literal interpretation of figurative language and poor reciprocity were invariably linked to the individuals' verbal responses, it was not possible to control for these differences while still accounting for the effect of literal interpretation and poor reciprocity. Nevertheless, it is acknowledged that differences in responses that were not due to literal interpretation of figurative language or poor reciprocity could also have affected the participants' ratings, which is a limitation of the present experiment.

Another limitation of the present experiment is that the interaction between each of the target ASD behaviours was not examined statistically. It is possible that the effect of ASD diagnosis on perceived deception, competence, and character is influenced by the degree to which particular combinations of the target behaviours are displayed. An avenue for further research may be to use each ASD behaviour as an indicator of a latent variable that represents "overall ASD behaviour." This latent variable can then be included as a mediator in a multilevel mediation model of the relationship between ASD diagnosis and perceived deception and credibility, to examine the extent to which the simultaneous presence of multiple ASD behaviours influences judgments of deception and credibility.[54]

Conclusions

The findings of this experiment indicated that ASD individuals were perceived to be more deceptive and less credible than their neurotypical peers. However, contrary to the hypothesis, gaze aversion, repetitive body movements, literal interpretation of figurative language, poor reciprocity, and flat affect did not mediate this relationship. Instead, the effect

[54] When this approach was attempted with the present data set, the model could not be estimated due to a non-positive definite Fisher information matrix. This may be attributable to the limited variance in ratings of literal interpretation of figurative language, poor reciprocity, and flat affect in the current data set.

of ASD diagnosis on perceived deception appeared to occur independent of any of the five target ASD behaviours, and it was an individual's overall presentation as having a disorder that mediated the association between ASD diagnosis and perceived credibility. Though it is uncertain exactly what this means, the results suggest that there is some form of noticeable difference in the general presentation of ASD individuals that make them more likely to be judged as deceptive and non-credible relative to neurotypical individuals.

CHAPTER 5

General Discussion

Overview

A pervasive cross-cultural stereotype exists that nonverbal behaviours such as gaze aversion and body movements are indicative of deception (The Global Deception Research Team, 2006; Vrij, Hartwig, & Granhag, 2019), despite consistent research showing evidence to the contrary (e.g., DePaulo et al., 2003; Sporer & Schwandt, 2007). Although this discrepancy is concerning, the implications of such widespread but inaccurate views have yet to be fully understood. Thus, the current project aimed to examine the potential effect that such stereotypes could have toward one particular population: individuals with Autism Spectrum Disorder (ASD).

ASD individuals are in a unique position with regard to the deception literature. On one hand, studies have shown that due to deficits in theory of mind and difficulties responding to social cues, ASD individuals are less likely than their neurotypical peers to purposefully deceive others (Ma et al., 2019; Talwar et al., 2012; Yang et al., 2017; Yi et al., 2014). However, at the same time, many of the commonly perceived cues to deception, such as gaze aversion and body movements, are characteristic behaviours of ASD individuals. This potentially places ASD individuals in a vulnerable position, as although they are less likely than their neurotypical peers to be deceptive, they may be more likely to be *judged* as being deceptive. Therefore, the purpose of this project was to examine empirically whether ASD individuals are more likely to be perceived as deceptive and non-credible than their neurotypical counterparts.

The project was conducted in two broad phases. The first phase attempted to provide experimental evidence of the effect of common ASD behaviours on judgments of deception and credibility, as the majority of past research on perceived behavioural markers of deception and credibility have relied on self-report measures. This feature of past research was considered to be a significant limitation, as studies have shown that there is a

discrepancy between self-reported judgment cues and actual judgment cues used (Hartwig & Bond, 2011), suggesting that individuals are not always consciously aware of the cues they rely on when forming judgments of deception or credibility. In addition, this phase also introduced two ASD behaviours that had not previously been examined in the deception literature but could also potentially be viewed as indicative of deception and non-credibility: literal interpretation of figurative language and poor reciprocity. The second phase of the project then aimed to explore whether, overall, ASD individuals are more likely to be perceived as deceptive and non-credible compared to their neurotypical peers, and if so, whether this effect is due to the demonstration of the target ASD behaviours.

The Effect of ASD Behaviours on Perceived Deception and Credibility

Overall, the results of Experiments 1 to 3 indicated that gaze aversion, repetitive body movements, literal interpretation of figurative language, poor reciprocity, and flat affect had significant effects on judgments of deception and credibility – individuals were perceived as more deceptive and less credible when they displayed these behaviours compared to when they did not. This is consistent with current literature on perceived markers of deception, which states that there is a widely held belief that gaze aversion and body movements are indicative of deception (Akehurst et al., 1996; Strömwall & Granhag, 2003; Vrij et al., 2019). This belief appears to be highly pervasive and has been found to occur in 75 countries around the world (The Global Deception Research Team, 2006), despite the fact that empirical studies have indicated that gaze aversion and body movements are unreliable cues to deception (DePaulo et al., 2003).

However, although the meta-analysis of Experiments 1 to 3 indicated that all target behaviours had a significant effect on judgments of deception and credibility, there were large discrepancies in the findings of each individual experiment, and the overall effect sizes were small. It was hypothesised that this may be attributable to the context of the stimulus

videos used across these three experiments, in which the target individuals were interviewed about biographical information and did not have any apparent motive to be deceptive. This was significant as studies have shown that the intent behind an act influences the extent to which it is perceived as deception (Meek, Bunde, Phillips-Meek, & Vendemia, 2019). For instance, “a lie is more of a lie” when it is told for self-benefit as opposed to the benefit of others (Cantarero & Szarota, 2017, p. 315). Therefore, Experiment 4 was then conducted to examine whether ASD behaviours would have stronger effects on judgments of deception and credibility when the target individual stood to benefit from being deceptive.

In Experiment 4, participants were led to believe that the target individuals may have been trying to deceive the interviewer for financial gain. The results revealed significant effects of repetitive body movements and poor reciprocity on perceived deception, and significant effects of poor reciprocity and flat affect on the specific credibility dimension of perceived caring. However, no other effects were detected. These results suggest that even when the target individual is presented as having a motive to be deceptive, the effects of ASD behaviours on judgments of deception and credibility may be weak.

Although the findings of this thesis appear to contradict the findings of several past studies that have detected large effects of certain ASD behaviours on perceived deception (e.g., Au & Wong, 2019; The Global Deception Research Team, 2006), these differences may be due to the fact that the methodology used in past research has varied considerably. As previously mentioned, the majority of past research on perceived behavioural markers of deception has relied heavily on self-report measures, with fewer studies having experimentally examined the effect of nonverbal behaviours on perceived deception or credibility. Among the experimental studies, many have investigated the effect of overall “deceptive behaviour” instead of individual behavioural cues (e.g., Au & Wong, 2019; Reinhard & Sporer, 2008). Because several cues were manipulated simultaneously, it is

difficult to determine from these studies the extent to which each individual behaviour affects judgments of deception or credibility.

The specific context and research design has also varied substantially between studies. For example, in the case of gaze aversion, Einav and Hood (2008) and Slessor et al. (2012) investigated whether young children and older adults, respectively, use gaze aversion as a cue to deception in everyday lying situations, while Willis and Wrightsman (1995) focused specifically on the testimony of rape victims and Neal and Brodsky (2008) on the perceived credibility of expert witnesses. In addition, while Einav and Hood (2008), Willis and Wrightsman (1995), and Neal and Brodsky (2008) presented the stimuli in the form of videos, Slessor et al. (2012) used still images of individuals demonstrating various degrees of gaze aversion. It is unsurprising, then, that the effect sizes detected in these four experiments ranged from small (Willis & Wrightsman, 1995) to medium (Neal & Brodsky, 2008) to large (Einav & Hood, 2008; Slessor et al., 2012). In light of these differences, it is likely that the relationship between nonverbal behaviours and judgments of deception and credibility is complex and moderated by multiple other variables. Therefore, to better understand how these behaviours interact to influence judgments of deception and credibility specifically in the context of an ASD population, a clinical sample was used in Experiment 5.

Vulnerability of ASD Individuals to Being Perceived as Deceptive and Non-Credible

The findings of Experiment 5 indicated that ASD individuals were perceived to be more deceptive and less credible compared to their neurotypical counterparts. However, this relationship was not influenced by the presence of gaze aversion, repetitive body movements, literal interpretation of figurative language, poor reciprocity, or flat affect, but only by the individuals' overall presentation as having a disorder. In addition, independent of ASD diagnosis, none of the target ASD behaviours were associated with increased perceptions of deception or non-credibility. It is possible that this was due to the limited range of levels of

ASD behaviour displayed by the target individuals, in contrast to Experiments 1 to 4 in which the behaviours were displayed at either a very high or very low level. Taken together, the findings of this project appear to consistently suggest that ASD behaviours have only small effects on judgments of deception and credibility: when displayed at high levels, they result in small negative changes in perceptions of truthfulness and credibility, but when displayed at low to moderate levels, no statistically significant effects on perceived deception and credibility are detected. Thus, although it appears that ASD individuals are more vulnerable to being perceived as deceptive and non-credible than neurotypical individuals, it remains uncertain *why* this is the case. However, drawing on attribution theories (Feldman & Chesley, 1984; Kelley & Michela, 1980) and the expectancy-violation model (Bond et al., 1992; Burgoon, 1983), it can be surmised that the presentation of ASD individuals somehow violates observers' expectations of how a truthful and credible person should behave.

In order to navigate a world that is full of novel and unfamiliar stimuli, individuals sometimes rely on categorical thinking: rather than evaluating the unique characteristics of each new stimulus, stimuli are construed based on the categories to which they belong (Macrae & Bodenhausen, 2000). Organising stimuli based on shared characteristics enables individuals to maximise the amount of information obtained about a particular stimulus while minimising the cognitive effort expanded (Rosch, 1978). However, not all categories possess clear-cut definitions and boundaries that dictate the criteria for group membership. Rather, many categories are understood with respect to prototypes – clear and representative examples of stimuli that belong to that category (Cantor & Mischel, 1977; Rosch, 1978). For instance, many individuals would not be able to define what the colour red looks like, nor where the boundaries of what constitutes "red" lie (e.g., whether burgundy belongs to the category "red"), yet most would have no difficulty identifying a clear case of an object that is red.

In the same way, although we do not yet know where the boundaries of what is perceived to be "truthful behaviour" lie, it appears that ASD individuals may not fit common prototypes of what a truthful individual looks like. It may simply be that this relationship is explained by other ASD behaviours that were not explored in the present study. Alternatively, it could be that it is subtle nuances (or combinations of same), rather than explicit behaviours, that cause ASD individuals to be judged negatively. This is consistent with the proposition by Sasson et al. (2017) that "negative first impressions of ASD are not founded on any one feature of expression, but rather represent an effect of subtle physical, dynamic, and auditory cues of presentation" (p. 8). Either way, the fact that participants were able to distinguish ASD individuals from neurotypical individuals in their ratings of deception and credibility suggests that there *were* noticeable differences between the two groups. However, further research is necessary to identify exactly what these differences are.

It must also be noted that although ASD individuals were perceived to be more deceptive relative to neurotypical individuals, this effect was small, and mean ratings for both groups still fell within the "truthful" or "neutral" range. Given that there was no concrete evidence to suggest that the target individuals were being deceptive, these ratings may simply reflect the truth-bias, whereby individuals have a tendency to assume that others are telling the truth (Park & Levine, 2015; Street & Masip, 2015). Levine (2014) argues that such a bias serves an adaptive function in everyday deception detection, as the majority of individuals will encounter truthful communication much more frequently than deceptive communication.

Knowledge of ASD Diagnosis

Experiment 4 and Experiment 5 also examined whether perceptions of deception and credibility would differ once participants were informed that the target individuals may have a diagnosis of ASD.

Perceived deception. The findings revealed that once the possibility that the target individuals had ASD was introduced, there was no longer a significant effect of ASD behaviour (in Experiment 4) or ASD diagnosis (in Experiment 5) on ratings of perceived deception; that is, individuals were rated similarly on perceived deception irrespective of whether they displayed an ASD behaviour or had an ASD diagnosis. This is in line with the proposition of attribution theories that an individual's judgment of the cause of another's behaviour is re-evaluated when new information comes to light. Prior to being given any information on the individuals' diagnostic status, participants had no obvious explanation for why the target individuals were displaying behaviours that were not congruent with social norms. They were therefore led to search for a cause to which the behaviour could be attributed, such as that the individuals were being deceptive. However, when new information was then made available that the individuals could have ASD, the likelihood that deception was the cause of the individuals' behaviour was diminished. Though these findings are preliminary, they suggest that biased deception judgements against ASD individuals can be negated by providing observers with information about their diagnostic status (see also Castillo & Mallard, 2012; Maras, Marshall, et al., 2019).

Perceived credibility. Likewise, informing participants that the target individuals may have ASD appeared to have a positive effect on ratings of perceived caring and character. However, this effect was not observed for ratings of perceived competence. It was hypothesised that this may be due to the fact that the term "Autism Spectrum *Disorder*" inherently implies an impairment in functioning. Informing participants that the individuals

could have ASD may have therefore primed participants to focus on the individuals' deficits. However, although there was no positive change in ratings of perceived competence of ASD individuals as a result of the diagnostic label, neither were any negative consequences observed. Thus, given the positive impact that a diagnostic label could have on perceived caring and character, it appears that disclosure of an ASD diagnosis may be an effective strategy to improve perceptions toward ASD individuals in certain situations.

Practical Implications

The findings of the present project suggest that while common ASD behaviours (i.e., gaze aversion, repetitive body movements, literal interpretation of figurative language, poor reciprocity, and flat affect) do affect judgments of deception and credibility, the extent to which they do may be much smaller than what has been reported in past research. Yet, in spite of this, ASD individuals were still found to be viewed as more deceptive and less credible than their neurotypical peers. Though it remains uncertain exactly why this is the case, the findings of the present study allude to the notion that there may be more that contributes to perceptions of deception and credibility than one's explicit behaviour. In the case of ASD individuals, it could be that there are subtle nuances in their speech and mannerisms that discriminate them from neurotypical individuals and result in unfavourable impressions.

Consequently, it is important for researchers and practitioners to recognise the complexity of factors that influence deception and credibility judgments when planning or evaluating possible interventions. For example, prior to a court trial, attorneys often guide witnesses and defendants on how to deliver a persuasive testimony – a process known as witness preparation (Boccaccini, Gordon, & Brodsky, 2005). As part of this process, witnesses and defendants are often made aware of common nonverbal behaviours that may negatively affect evaluations of their testimony and are taught to better control these

behaviours (Boccaccini, 2002). For instance, defendants may be instructed to maintain appropriate eye contact with the jury, as gaze aversion is commonly associated with lack of remorse (Corwin, Cramer, Griffin, & Brodsky, 2012). Unfortunately, if ASD individuals are perceived as non-credible as a function of their overall presentation as having a disorder, simply instructing them to display certain overt behaviours may not be sufficient to negate this effect (Sasson et al., 2017). Instead, appropriate disclosure of an ASD diagnosis, in conjunction with relevant education on ASD symptoms, may be a more effective way to reduce this bias (Sasson & Morrison, 2019).

Similarly, research is emerging on the effectiveness of job interview training in improving interview performance among ASD individuals (e.g., Kumazaki, Muramatsu, Yoshikawa, Matsumoto, et al., 2019; Kumazaki et al., 2017; Morgan, Leatzow, Clark, & Siller, 2014). These training programs are designed to assist ASD individuals in developing good communication skills, such as appropriate eye contact and facial expressions (Kumazaki, Muramatsu, Yoshikawa, Corbett, et al., 2019). Though current evidence has demonstrated the effectiveness of such programs in improving the quality of responses (Burke et al., 2018) and enhancing nonverbal communication (Morgan et al., 2014; Smith et al., 2017), less information is available on whether they result in improved employment outcomes (e.g., Smith et al., 2015; Smith et al., 2017). The findings of the current project suggest that communication skills such as eye contact, reciprocity, and emotional expression, may not be sufficient, in and of themselves, to predict perceptions toward ASD individuals, as there are likely other factors that moderate this relationship. Thus, it is crucial for research in this area to include the direct measurement of outcomes of interest (e.g., job offers) when evaluating the efficacy of an intervention, as improved communication skills may not necessarily result in improved job outcomes.

Limitations

Attributions Not Measured

This project was designed on the premise of attribution theories (Kelley & Michela, 1980), which propose that perceptions of deception and non-credibility arise due to the natural tendency of observers to attribute a cause to unexpected or atypical behaviours (Feldman & Chesley, 1984). While the findings of the project do appear to be consistent with this hypothesis, attributions were not directly measured. As a result, a significant limitation of this project is that no conclusions can yet be drawn regarding the underlying cognitive processes that led to participants' judgments of deception and credibility.

Situational Context

Another limitation of the project is that the effect of ASD behaviours on judgments of deception and credibility was only examined in two contexts – one in which individuals were interviewed about biographical information and another in which individuals were questioned about their involvement in "stealing" money from a psychology lab. This is significant for two reasons. Firstly, while it can be argued that these situations bear loose resemblance to real-life scenarios such as a job interview or police interview, respectively, they are still highly artificial situations. These scenarios were chosen for the present study as they allowed the target individuals (in Experiment 1, Experiment 4, and Experiment 5) to provide responses that were completely truthful. Had a mock job interview or police interview been used instead, some degree of imagination would have been required of the target individuals as they would have needed to place themselves in a hypothetical situation. For example, in order to stage a job interview, the target individuals would have needed to imagine that they had applied for a particular job, even though they had not. While it remains that they would not have been intentionally trying to deceive the interviewer, whether it could be said that their responses were completely truthful is questionable. Therefore, in the current project, the

opportunity for the target individuals to provide truthful and natural responses was prioritised over using a more common real-life situation. However, consequently, the ecological validity of the study remains uncertain.

In addition, the premise of the argument of attribution theories for why the target behaviours influence judgments of deception and credibility is that these behaviours are unexpected or atypical, thus prompting observers to search for explanations for the behaviour (Feldman & Chesley, 1984). From this, it can be speculated that if the individual was in a situation in which it was expected that the target behaviours be displayed, the presence of the target behaviours would have no effect, or perhaps even the opposite effect, on judgments of deception and credibility. However, because this project only examined contexts in which the demonstration of ASD behaviours is not the norm, this conjecture could not be empirically tested. As a result, an important question that remains is, do ASD behaviours only affect judgments of deception and credibility under certain circumstances and not others?

Directions for Future Research

Underlying Cognitive Processes

An important avenue for future research would be to examine the underlying cognitive processes involved in the formation of deception and credibility judgments. The fact that the effects of ASD behaviours and ASD diagnosis on perceived deception and credibility in the present study were diminished once participants were informed that the target individuals may have ASD appears to support the causal mechanisms proposed by attribution theories. However, further research directly examining participants' attributions at each stage of impression formation is necessary in order to fully test this hypothesis.

While attribution theories have received much attention in the deception literature, few studies in this area have directly measured causal attributions, and limited methods have been developed to measure causal attributions in relation to nonverbal behaviours. In a recent

study, Maras, Marshall, et al. (2019) examined mock jurors' perceptions of the credibility of a defendant with ASD and investigated whether these perceptions differed when the jurors were informed of the defendant's ASD diagnosis compared to when they were not. Attributions were evaluated using the open-ended question, "Why did you give this rating of [likeability]? Please explain your answer" (Maras, Marshall, et al., 2019, p. 999). They then used thematic analysis based on the procedure outlined by Braun and Clarke (2006) to identify meaningful patterns within the data. The findings of their analysis were in line with the proposition of attribution theories: jurors attributed unexpected nonverbal behaviours to deception and non-credibility when no explanation for the behaviour was available but attributed the behaviours to ASD when they knew of the individual's diagnosis.

However, there were limitations to their method. Instead of observing the defendant's behaviour, participants were provided with vignettes that described what happened at the scene of the crime, including the defendant's nonverbal behaviours. For example, the defendant was said to be "visibly sweating" and "repeatedly rocking back and forth" (Maras, Marshall, et al., 2019, p. 1007). In real life, although both of these cues would have been present simultaneously (in addition to many other cues), they may not have both been noticed by observers. Due to the large amount of sensory information available at any one time, it is common for observers to selectively attend to certain cues more closely than others (Treisman, 1964), and the specific cues that are attended to may differ from person to person. One observer may have noticed the rocking but not the sweating, another may have noticed the sweating but not the rocking, and yet another may not have noticed either. In contrast, when presented in a vignette, there is no need for certain cues to be attenuated, as these statements – "visibly sweating" and "repeatedly rocking back and forth" – can be attended to sequentially. As a result, both statements provide equally accessible pieces of information.

Various theories of impression formation have been put forward, but broadly speaking, impression formation is thought to comprise four stages: (1) the behaviour is observed, (2) a cause is attributed to the behaviour, (3) an impression of the target is formed, and (4) an evaluation of the target is made (Pavitt, 2009). When information is presented in writing, the first stage (observation of behaviour) is, to some degree, narrowed down by the reduced information made available to the observer. This contrasts with a live scenario where the observer is fully immersed in the sights and sounds of the situation. Thus, although the questions used by Maras, Marshall, et al. (2019) may be adequate to measure attributions in the context of written information, they may not be suitable for use when aiming to measure attributions toward directly observed behaviour. In such situations, it would be necessary to first identify which (if any) of the behaviours were noticed and to then tease apart which causes are attributed to which behaviours.

In their study of nonverbal behaviour among couples, Manusov, Floyd, and Kerssen-Griep (1997) measured participants' attributions of their partner's nonverbal behaviour using a two-step process. They first asked participants to indicate the nonverbal behaviours observed using the question, "Did any of your partner's behaviours stand out to you [during the videotaping]? If yes, please describe the behaviours that you noticed and approximately when you noticed them. If there was more than one behaviour that you noticed, or if you noticed behaviours at different times, please write down all of these" (Manusov et al., 1997, p. 244). They then assessed the causal attributions for the behaviours using the open-ended questions, "What did the behaviours mean to you? What was communicated?" and "Referring to the same behaviours, what do you think would explain their behaviours?" (Manusov et al., 1997, p. 244). Independent raters reviewed the responses and rated each attribution on the following domains: locus of control, stability, specificity, controllability, intentionality, and personal responsibility (see Weiner, 1979, 1985).

I propose that this measure by Manusov et al. (1997) could be adapted for use in examining the thought processes involved in the formation of deception and credibility judgments. The two sets of questions suggested by Manusov et al. (1997) correspond to the first two stages of impression formation, respectively, in which the behaviours that are observed are identified and the causes attributed to these behaviours are described. Based on this information, an impression of the target individual is then formed (e.g., whether the individual is telling the truth) and an overall evaluation of the target individual is made (e.g., whether the individual is trustworthy). Thus, in the context of deception and credibility judgments, a coding system could be developed to assist in (1) identifying the nonverbal behaviours observed, and (2) classifying the causes attributed to each behaviour, to provide information on the individual's cognitions during the first two stages of impression formation.

In addition, in contrast to the procedure employed by Manusov et al. (1997) where the observers' attributions were evaluated by trained raters, I propose that ratings of each dimension of the attribution (i.e., locus of control, stability, specificity, controllability, intentionality, and personal responsibility) should also be obtained directly from the observers. This is because perceptions of these dimensions are likely to have a greater influence on impression formation than objective measures. For example, two observers who witness an individual fidgeting may both attribute the behaviour to the fact that the individual is nervous because he is lying. However, an observer who perceives deceptiveness to be stable over time would be more likely to also evaluate the individual as untrustworthy, compared to an observer who believes that deceptiveness can vary across time and contexts (regardless of the actual stability of deceptiveness).

Attempting to measure and understand cognitive processes is undoubtedly a challenge in the study of any human behaviour, and deception and credibility judgments are no

exception. Nevertheless, it is essential for research to continue working toward the development of methods to do so, as examining causal attributions is the only way to truly test attribution theories in the context of deception and credibility judgments. Without an empirical measurement of attributions, our understanding of how nonverbal behaviours influence perceptions of deception and credibility would be based primarily on assumptions that have not actually been validated.

Understanding the Relationship between ASD and Perceived Deception and Credibility

The results of Experiment 5 are consistent with the hypothesis that ASD individuals would be perceived as more deceptive and less credible than neurotypical individuals. However, no evidence was found to support the hypothesised pathways through which this relationship was thought to occur. Consequently, a crucial question still remains unanswered: *Why* are ASD individuals judged as more deceptive and less credible than their neurotypical peers? The overall findings of the project point toward a complex interaction of variables and highlight the likelihood that this phenomenon is one that is not easily understood. Nevertheless, it remains an area deserving of further research, as understanding the interplay of factors that underpin this relationship would be the first step toward reducing biased deception and credibility judgments toward ASD individuals. Here I propose three possible avenues for future research that could be considered: examining groups of cues, examining the "truthful prototype," and examining expectancy violation.

Examining groups of cues. Rather than examining individual cues in isolation, it may be useful to examine whether certain *types* of cues are more predictive of perceived deception and credibility than others. For example, an interaction could be broken down into verbal content, paralinguistic cues, and nonverbal cues. By presenting various combinations of these cues to observers (e.g., by providing the observer with the transcript only, audio only, video only, audio and video, etc.), the degree to which each of these groups of cues

interact with ASD diagnosis to affect judgments of deception and credibility can be examined. Should certain types of cues be found to be more predictive of perceived deception and credibility than others, this may then assist researchers to develop a more targeted approach in trying to identify possible behavioural mediators of the relationship between ASD diagnosis and perceived deception and credibility. Considering groups of cues as a whole would also enable researchers to better investigate the possibility that it is particular combinations of behaviours that affect perceived deception and credibility, rather than individual behaviours on their own.

Examining the "truthful prototype." According to the norm-violation model of veracity judgments, individuals infer deception from nonverbal behaviours that violate social standards of appropriate behaviour (Levine et al., 2000). This suggests that perceived deception may arise from a violation of the "truthful prototype" as opposed to an activation of the "deceptive prototype." While the behaviours that constitute the deceptive prototype have been fairly well documented (e.g., The Global Deception Research Team, 2006), much less is known about the behaviours associated with perceived truthfulness. Though it would be easy to assume that the truthful prototype is simply the opposite of the deceptive prototype, this may not necessarily be the case. It is possible that the way in which the truthful prototype and deceptive prototype are construed are qualitatively different. Alternatively, it could be that, while both share similar but opposite features, the most salient features of the truthful prototype differ from the most salient features of the deceptive prototype (e.g., the first thing that comes to mind when asked "How can you tell when people are lying?" may not be the direct opposite of the first thing that comes to mind when asked "How can you tell when people are telling the truth?").

This seemingly counterintuitive notion is not exclusive to deception and truthfulness, as similar debates have been ongoing in other fields of psychology. For example, there is

evidence to suggest that happiness and sadness may not be bipolar opposites (Larsen & McGraw, 2014; Rafaeli & Revelle, 2006). Therefore, it is important that our understanding of what is perceived to be indicative of truthfulness is not limited by the assumption that it is the opposite of what is perceived to be indicative of deception. Instead, the truthful prototype warrants empirical research in its own right. Examining deviations from this prototype may then shed light on possible behavioural cues that have previously been overlooked.

Examining expectancy violation. The expectancy-violation model proposes that it is not specific behaviours per se that lead to perceptions of deception and non-credibility, but rather, the fact that these behaviours are unexpected (Bond et al., 1992; Burgoon, 1983). Consequently, it can be surmised that the extent to which a particular behaviour is considered to be indicative of deception or non-credibility may differ from observer to observer, depending on their own unique expectations of how the target individual should behave. To test this hypothesis, researchers have measured observers' expectations and examined whether the effect of nonverbal behaviour on perceived deception or credibility was influenced by the degree to which their expectations were violated (e.g., Ask & Landström, 2010; Bosma et al., 2018; Hackett, Day, & Mohr, 2008). In line with the proposition of the expectancy-violation model, the findings appear to suggest that nonverbal behaviours have stronger effects on judgments of deception and credibility when they are more incongruent with the observer's expectations (Ask & Landström, 2010; Bosma et al., 2018; Hackett et al., 2008). It is thus possible that the reason why only small effects of ASD behaviours were detected in the present study was that the specific cues that were considered to be indicative of deception and non-credibility varied for each observer, and therefore, these effects were not detected when overall mean values were examined.

However, a significant challenge to measuring expectancy violation is that once a belief has been formed, individuals have a tendency to search for information that confirms,

rather than disconfirms, their belief (Darley & Gross, 1983; Nickerson, 1998). In the case of deception and credibility judgments, in order to avoid priming effects, researchers have typically administered the measure of expectations after the measure of deception or credibility (e.g., Ask & Landström, 2010; Hackett et al., 2008). However, this order of measurement too is problematic, as observers may then be likely to search for evidence that supports their rating of deception or credibility. For instance, observers who rated the target individual as deceptive may selectively focus on behaviours that they perceive to confirm this belief and ignore behaviours that they perceive to disconfirm this belief. This is consistent with research that has demonstrated that observers who knew that a target individual was lying rated the individual as demonstrating significantly greater gaze aversion than observers who did not have any information on the individual's veracity (Levine, Asada, & Park, 2006). Thus, although current research seems to suggest that the effect of nonverbal behaviour on perceived deception and credibility is moderated by observers' expectations (Ask & Landström, 2010; Bosma et al., 2018; Hackett et al., 2008), these findings may be confounded by the fact that we cannot be certain of the causal order of these perceptions.

Therefore, when attempting to measure expectancy violation in the context of deception and credibility judgments, greater steps need to be taken to increase the psychological distance between measures of expectations and measures of deception or credibility; for example, by also measuring expectations of other distractor constructs (e.g., expectations of an athletic individual) and/or by introducing a time delay between the two measurements (e.g., conducting the experiment across two sessions). Having a reliable and valid measure of observers' expectations would then enable us to better explore how nonverbal behaviour and expectancy violation interact to affect judgments of deception and credibility. Once again, such an approach may reveal significant effects of certain nonverbal

behaviours that were not detected when individual differences were not taken into consideration.

The Effect of ASD Behaviours on Perceived Deception and Credibility in Different Contexts

As discussed above, a significant limitation of only examining two types of situations in the present project is that it remains uncertain whether the current findings would also hold true under differing circumstances. Of particular interest is whether the effect of ASD behaviours on judgments of deception and credibility would differ in situations where the target behaviours are more or less likely to be expected by observers.

Cultural context. In 1969, Ekman and Friesen coined the term "cultural display rules" to refer to "cultural norms learned early in life that govern the regulation of expressive behaviours depending on social contexts" (Matsumoto & Hwang, 2013, p. 1). Display rules dictate the standards of "acceptable" emotional expression in a given situation and guide individuals to vary the type (i.e., displaying an emotion that is different to the emotion experienced) or intensity (i.e., exaggerating or minimising expressions of the emotion experienced) of emotions displayed in order to fit with the situation. For example, in a cross-cultural study involving 32 countries, it was found that, overall, individuals from individualistic cultures reported greater norms for emotional expressivity than individuals from collectivistic cultures (Matsumoto et al., 2008). It is possible that this difference in cultural display rules arises from the higher value that individualistic cultures place on individual expression, in contrast to collectivistic cultures which value conformity and relating to others. Indeed, it has been found that individuals from collectivistic cultures display more inhibitory emotional behaviours, such as averting their gaze or suppressing their smiles, than those from individualistic cultures (Cordaro et al., 2018). In such cultures, where one is expected to attenuate or suppress their emotional displays, would behaviours such as

flat affect influence judgments of deception and credibility to the same extent that they would in an individualistic culture?

Similarly, McCarthy, Lee, Itakura, and Muir (2006) found that individuals from different cultures differed in the amount of eye contact they maintained with a conversation partner. When participants were asked simple memory retrieval questions, Trinidadian and Canadian participants maintained eye contact with the interviewer for majority of the interview (88% and 64% of the time, respectively), while Japanese participants only maintained eye contact with the interviewer 54% of the time. McCarthy et al. (2006) suggest that this reflects cultural differences in the function of eye contact – maintaining eye contact demonstrates confidence in Trinidadian and Canadian culture, but excessive eye contact is impolite in Japanese culture (where downward gaze is seen as a sign of respect).

The current literature on deception posits that the stereotype that liars avoid eye contact is pervasive and cross-cultural (The Global Deception Research Team, 2006); however, what constitutes "avoiding eye contact" has not been specified and may vary from culture to culture. Drawing on the findings of McCarthy et al. (2006) as an illustration, if the average Trinidadian maintains eye contact for 88% of a conversation, anything less than this may be interpreted by a Trinidadian as gaze aversion; however, in contrast, the average Japanese person may only consider their conversation partner to be exhibiting gaze aversion if they maintain eye contact for less than 54% of the conversation. Would the discrepancy between level of expected eye contact and level of actual eye contact displayed by ASD individuals therefore be greater in Trinidad than in Japan? And by extension, would ASD individuals in Trinidad be more vulnerable to being perceived as deceptive and non-credible than ASD individuals in Japan? In light of this, an area for further research would be to examine whether the extent to which ASD behaviours affect judgments of deception and credibility is dependent on the degree to which these behaviours are culturally acceptable.

Culture not only dictates standards of socially acceptable behaviour but also influences the way in which developmental disorders such as ASD are perceived. For example, Sage and Jegatheesan (2010) conducted a qualitative study involving two families of children with ASD from different cultural backgrounds (European-American and Asian-American, respectively). It was found that while the European-American family were proud of their son and open about his diagnosis, the Asian-American family expressed the belief that their son was born with ASD as punishment for the sins of their ancestors, which led to a desire to conceal the diagnosis from others (Sage & Jegatheesan, 2010). Similarly, while studies in Western societies have demonstrated appropriate levels of knowledge of ASD in the community (Jensen et al., 2016; Stronach, Wiegand, & Mentz, 2019), low levels of stigma toward ASD relative to other disorders (Bachmann et al., 2019; Feldman & Crandall, 2007), and positive portrayals of ASD individuals in the media (Belcher & Maich, 2014; Stern & Barnes, 2019), research among Eastern cultures has demonstrated the prevalence of high levels of stigma and discrimination toward ASD individuals (Kang-Yi et al., 2018; Obeid et al., 2015; Park, Lee, & Kim, 2018; Scior, Kan, McLoughlin, & Sheridan, 2010) and their families (Patra & Kumar Patro, 2019; Zhou, Wang, & Yi, 2018).

The findings of the present project appear to suggest that the overall presentation of an individual as having a disorder mediates the relationship between ASD diagnosis and perceived credibility, more so than specific behaviours. Considering that the meaning attached to having a developmental disorder varies from culture to culture, it is likely that the way in which ASD influences judgments of deception and credibility would also differ across cultural contexts.

In addition, the results of the present study indicated that participants regarded the target individuals more positively once they were informed that the target individuals may have ASD. From the perspective of attribution theories, this change in perception occurs

because the diagnostic label provides an explanation for the target individuals' atypical behaviour and presentation, thus reducing the likelihood that these factors are attributed to deception or non-credibility (Feldman & Chesley, 1984). However, we must also take into consideration the fact that participants of the current project (who were recruited from Australia and the United States) hail primarily from cultures where there is evidence suggesting appropriate awareness of ASD (Stronach et al., 2019) and relatively low stigma toward ASD individuals (Feldman & Crandall, 2007). Had the study been conducted in a population where negative beliefs and attitudes toward ASD are prevalent, it is possible that the findings could have differed substantially. Take, for instance, the belief reported in the study by Sage and Jegatheesan (2010) that ASD is caused by the wrongdoings of one's ancestors. Such a belief reflects the inherent assumption that the individual is immoral or, at the very least, from an immoral family. Thus, in a society where these views are held, it would not be surprising if informing observers that the target individual has ASD results in increased perceptions of deception and non-credibility, regardless of the fact that the diagnosis provides an explanation for the individual's atypical presentation. It would therefore be interesting to explore if and how the relationship between ASD and perceived deception and credibility is influenced by the meaning ascribed to having a developmental disorder.

Situational context. Display rules do not only differ between cultures but also between social contexts. For example, many organisations and professions have social norms that dictate the way in which employees are to manage their emotional expression. While many occupations require the display of positive emotions, such as flight attendants and waiters, Trougakos, Jackson, and Beal (2011) highlight that there are also professions in which any form of emotional expression is discouraged. As one judge commented, "Being

unemotional and neutral while interacting with the public is the definition of my job" (Trougakos et al., 2011, p. 350).

Attribution theories (Kelley & Michela, 1980) posit that once a behaviour is observed, observers search for explanations for why the target individual engaged in the behaviour. These theories thus propose that when an unexpected behaviour is observed, in the absence of other plausible causes for the behaviour, observers may attribute the behaviour to deception or non-credibility (Feldman & Chesley, 1984). If, then, behaviours such as flat affect could, under certain circumstances, be attributed to the demands of a specific occupation or situation, would that serve as a sufficient explanation for the behaviour? Would observers therefore be less likely to search for other alternative explanations, such as that the individual is deceptive or non-credible? On that account, it would be important for future research to examine the effect of ASD behaviours on judgments of deception and credibility under a variety of circumstances, as it is likely that these effects are not universal but occur as a function of multiple individual and situational factors.

The Role of Prior Knowledge of ASD Diagnostic Status

The findings of Experiment 4 and Experiment 5 suggested that observers were less likely to perceive the target individuals as deceptive once they were informed that the individuals may have a diagnosis of ASD. While the use of a within-subjects design in the present study makes it difficult to account for other possible variables (e.g., first impressions, demand characteristics), there appears to be increasing evidence in the literature that providing information on an individual's ASD diagnosis results in more positive interpersonal judgments (e.g., Maras, Crane, Walker, & Memon, 2019; Maras, Marshall, et al., 2019; Matthews et al., 2015; Sasson & Morrison, 2019). For example, a recent study by Maras, Marshall, et al. (2019) found that mock jurors who were informed that a defendant had ASD perceived the defendant as more honest and less guilty than those who were not

informed of his diagnosis. Follow-up qualitative analyses revealed that, consistent with attribution theories, mock jurors who were told that the defendant had ASD were more likely to attribute his inappropriate behaviours to his ASD, while in contrast, mock jurors who were not given any information on ASD diagnosis reported that the defendant's aggressive behaviours, body language, and gaze aversion led them to believe that he was being deceptive to protect his own interests (Maras, Marshall, et al., 2019).

An important difference between the present study and that of Maras, Marshall, et al. (2019) is that, in the present study, the stimulus videos provided no concrete information as to whether the target individuals had taken the money (and in actual fact, they had not), whereas the vignettes used by Maras, Marshall, et al. (2019) provided unequivocal evidence that the defendant was guilty. Nevertheless, in both studies, perceptions of the target individuals were more positive when they were presented as having ASD. While it is an encouraging finding that an ASD label could potentially reduce the risk of biased deception judgments, Maras, Marshall, et al. (2019) caution that further research is necessary to fully understand the impact that a diagnostic label could have on interpersonal perceptions, as it may, at the other extreme, lead to unduly lenient judgments.

In addition, the findings of this project indicated that informing participants that the target individuals may have ASD also had significant positive effects on the credibility domains of perceived caring and character, but did not have any significant effect on the competence domain. This may be particularly relevant in situations such as college or job interviews, where an individual's capacity to undertake a particular role or course of study is being assessed. Under Section 15 of the *Disability Discrimination Act 1992* (Cth), it is unlawful for employers to discriminate against an individual on the basis of a disability. Consequently, there is currently no legal requirement for individuals to disclose a disability to their employer unless the disability will impact their capacity to meet the genuine demands of

the job. It would thus be worthwhile for future research to examine how disclosure of an ASD diagnosis influences perceptions of credibility in situations such as a job interview, and how these perceptions then affect outcomes for ASD individuals. Although the disclosure of an ASD diagnosis will ultimately remain a highly personal choice, understanding how others react to such information may assist ASD individuals in making a more informed decision.

Conclusions

To the best of my knowledge, this project is the first to examine whether the demonstration of stereotypical ASD behaviours (i.e., gaze aversion, repetitive body movements, literal interpretation of figurative language, poor reciprocity, and flat affect) causes ASD individuals to be perceived as more deceptive and less credible than their neurotypical peers. The findings suggested that, as predicted, ASD individuals were perceived to be more deceptive and less credible relative to neurotypical controls. However, limited support was found for the hypothesised pathways by which this relationship was thought to occur. Independent of ASD diagnosis, the target ASD behaviours had only weak effects on judgments of deception and credibility. Instead, the results appear to suggest that an individual's overall presentation as having a disorder has a stronger effect on the relationship between ASD diagnosis and perceived deception and credibility. It is possible that this could be due to the presence of other ASD behaviours that were not accounted for in the present study, or to the complex interaction of multiple different behaviours and idiosyncrasies. Nonetheless, the findings of this project indicate that there are noticeable differences in the presentation of ASD individuals that distinguish them from neurotypical individuals and result in less favourable perceptions. Further research is thus necessary to better understand the exact mechanism by which this effect occurs.

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APPENDICES

Appendix A

Interview Questions for Stimulus Videos (Experiment 1)

Table A1

Interview Questions Used in the Stimulus Videos by Condition of ASD Behaviour

Condition of ASD Behaviour	Interview Questions
Gaze Aversion	1. When you were a child, what did you like to do in the summertime? 2. Tell me as much as you can remember about your most memorable summer.
Repetitive Body Movements	1. Where did you go to high school? 2. What did you like most about school? 3. What did you like least about school? 4. When you were at school, would you describe yourself as the class clown?
Inappropriate Emotional Displays	1. Could you tell me about your experience with different cultures? 2. Can you think of a time when you witnessed an act of discrimination? Tell me more about it.
Literal Interpretation of Figurative Language	1. Could you tell me about the happiest time of your life? 2. Could you now tell me about a time when you had *a bitter pill to swallow*?
Poor Reciprocity	1. Could you tell me about what you like to do in your free time?
Flat Affect	1. Could you tell me a little about some of the places you've travelled to? 2. What is your most memorable travel experience?
Control Condition	1. When and where were you born? 2. Tell me as much as you can about where you grew up for the first six years of your life.

Appendix B

Definitions of Behaviours Shown to Participants in Preliminary Study 1 (Experiment 1)

Please familiarise yourself with the following definitions and click next when you have finished:

Gaze Aversion: The individual did not maintain eye contact with the interviewer.

Repetitive Body Movements: The individual demonstrated repetitive body movements periodically throughout the conversation.

Hesitation: The individual demonstrated significant hesitation when giving his response or excessively used fillers such as "uhm" and "ah."

High Pitch: The individual's voice was high pitched for most of the interview.

Inappropriate Emotional Displays: The individual demonstrated at least one emotional reaction that was inappropriate for the topic of conversation.

Literal Interpretation of Figurative Language: The individual had the tendency to take statements (e.g. metaphors, sarcasm) literally.

Blushing: The individual became pink/ red in the face at least once.

Monologue: The individual talked continuously and in great detail about a particular topic of interest, without regard for the interviewer.

Speech Errors: The individual stuttered, unnecessarily repeated phrases, or made errors in pronunciation.

Flat Affect: The individual exhibited limited facial expression and vocal intonation throughout the conversation.

Fast Talking: The individual was speaking at a rate that was noticeably fast.

Inconsistency: The individual's answers were inconsistent/ did not stay the same throughout the interview.

Appendix C

Checklist of Behaviours Used in Preliminary Study 1 (Experiment 1)

Did the individual in the video demonstrate any of the following behaviours?

You may select on or more answers. If you did not notice any of the following behaviours, select none of the above.

- ☐ Gaze Aversion
- ☐ Repetitive Body Movements
- ☐ Hesitation
- ☐ High Pitch
- ☐ Inappropriate Emotional Displays
- ☐ Literal Interpretation of Figurative Language
- ☐ Blushing
- ☐ Monologue
- ☐ Speech Errors
- ☐ Flat Affect
- ☐ Fast Talking
- ☐ Inconsistency
- ☐ None of the above

Appendix D

Modified Version of McCroskey and Teven's (1999) Measure of Source Credibility

Please indicate your impression of the person in the interview by selecting the appropriate point between the pairs of adjectives below. The closer the number is to an extreme, the more accurate you consider that description to be.

Intelligent	1	2	3	4	5	6	7	Unintelligent*
Untrained	1	2	3	4	5	6	7	Trained
Inexpert	1	2	3	4	5	6	7	Expert
Informed	1	2	3	4	5	6	7	Uninformed*
Incompetent	1	2	3	4	5	6	7	Competent
Bright	1	2	3	4	5	6	7	Stupid*
Cares about the interviewer	1	2	3	4	5	6	7	Doesn't care about the interviewer*
Has the interviewer's interests at heart	1	2	3	4	5	6	7	Doesn't have the interviewer's interests at heart*
Self-centred	1	2	3	4	5	6	7	Not self-centred
Concerned with the interviewer	1	2	3	4	5	6	7	Unconcerned with the interviewer*
Insensitive	1	2	3	4	5	6	7	Sensitive
Not understanding	1	2	3	4	5	6	7	Understanding
Honest	1	2	3	4	5	6	7	Dishonest*
Untrustworthy	1	2	3	4	5	6	7	Trustworthy
Honourable	1	2	3	4	5	6	7	Dishonourable*
Moral	1	2	3	4	5	6	7	Immoral*
Unethical	1	2	3	4	5	6	7	Ethical
Phoney	1	2	3	4	5	6	7	Genuine

*Denotes items that are reversed-scored.

Appendix E

Evaluation of Credibility Model Fit

Experiment 1

McCroskey and Teven's (1999) measure of source credibility is suggested to comprise three factors of six items each: Competence, Caring, and Character. To test the model fit, a confirmatory factor analysis (CFA) using maximum likelihood (ML) estimation was carried out using IBM SPSS Amos 23. Because a within-subjects design was used in Experiment 1, each participant completed the measure of source credibility a total of seven times (once per condition of ASD behaviour). Therefore, to ensure the independence of observations, responses were randomly selected such that only one response per participant was included in the analysis (N = 161).[55] The three factors in the present model were allowed to co-vary. The first variable of each factor was fixed to a loading of 1. The error terms for the observed variables were assumed to be independent of all other error terms.

Assumptions of normality. Prior to the analysis, the assumptions of univariate and multivariate normality were assessed. The assumption of univariate normality was violated for one item, with a standardised value of skewness of -3.40. There was also significant multivariate non-normality, with Mardia's coefficient (measure of multivariate kurtosis) of 143.59 (standardised estimate of 33.95). As traditional maximum likelihood estimation is highly sensitive to violations of normality, bootstrapping (Efron & Tibshirani, 1986) was employed to assess the model fit as bootstrap methods are not dependent on the assumption

[55] It is acknowledged that the random sampling of observations resulted in the loss of a substantial amount of data. However, no evidence was available to guide the specification of a higher-level factor structure, nor could it be assumed that the factor structure and factor loadings at each level of the model were equal, suggesting that the use of multilevel confirmatory factor analysis (MCFA) may not be appropriate (see Wu, Lin, Nian, & Hsiao, 2017). Although alternative MCFA approaches have recently been proposed to overcome these limitations, limited information is available as yet on the performance of these techniques in analysing models with more than one factor (Wu et al., 2017). Therefore, given that the aim of the confirmatory factor analysis was simply to validate the proposed factor structure of McCroskey and Teven's (1999) measure of source credibility (and that the higher-level factor structure of the model was not of any theoretical significance), the random sampling approach used was thought to be adequate for the purpose of this study.

of normality (Ichikawa & Konishi, 1995). A total of 2000 bootstrap samples were used. The model fit was therefore further assessed using the Bollen-Stine corrected *p* value instead of the traditional maximum likelihood *p* value.

Three-factor model. Results indicated that the model was a poor fit for the data, $\chi^2(132) = 491.31$, $p < .001$, TLI = .85, CFI = .87, RMSEA = .13 (see Table E1). The standardised residual covariance matrix revealed a residual value of 2.74 between Co2[56] and Co3, which was indicative of model misfit (Byrne, 2001). Examination of the modification indices revealed large covariance between the error terms for items Co2 and Co3 (MI = 65.07, EPC = .54), and Ca5 and Ca6 (MI = 35.08, EPC = .34). In addition to the factor Caring, item Ca6 was also found to cross-load onto the factors Competence (MI = 7.63, EPC = .17) and Character (MI = 14.66, EPC = .19), while item Ca5 was found to cross-load onto the factor Character (MI = 5.53, EPC = .12). Given the presence of a large residual value, large error covariance, and items that cross-load onto more than one factor, respecification of the model was pursued.

Single-factor model. Given that the three-dimension model of McCroskey and Teven's (1999) source credibility measure did not appear to be a good fit for the data, a single-factor model was evaluated. However, the results indicated that a single-factor model was also a poor fit for the data, $\chi^2(135) = 883.48$, $p < .001$, TLI = .70, CFI = .73, RMSEA = .19. Therefore, respecification of the model was again pursued.

Respecified Model 2. Post hoc adjustments were made in an attempt to develop a better-fitting model for use in the present experiment. Following the argument of McCroskey and Teven (1999) that Competence, Caring, and Character are three distinct factors, items Ca5 and Ca6 were deleted from the respecified model analysis. The indices of fit indicated a

[56] Items are labelled by subscale and item number, with Co, Ca, and Ch, indicating items from the Competence, Caring, and Character subscales respectively.

Table E1

Goodness-of-Fit Indices for McCroskey and Teven's (1999) Measure of Source Credibility (Experiment 1)

Model	Goodness-of-Fit Measure				
	χ^2	*df*	TLI	CFI	RMSEA
Optimal value [a]	-	-	> .95	> .95	< .06
Hypothesised three-factor model	491.31***	132	.85	.87	.13
Single-factor model	883.48***	135	.70	.73	.19
Respecified Model 2; three-factor model, items Ca5 and Ca6 deleted	341.80***	101	.89	.90	.12
Respecified Model 3; three-factor model, items Ca3 and Co2 deleted	204.37**	74	.93	.94	.11

Note. TLI = Tucker-Lewis index; CFI = comparison fit index; RMSEA = root mean square error of approximation.
[a] Hu and Bentler (1999)
**$p \leq .01$, ***$p \leq .001$

slight improvement in the model fit, $\chi^2(101) = 341.80$, $p < .001$, TLI = .89, CFI = .90, RMSEA = .12. A large standardised residual covariance value of 2.75 between items Co2 and Co3 still remained. Item Ca3 was also found to have poor standardised item loading onto the factor Caring of .37. The large standardised residual value and the poor factor loading of item Ca3 were taken into consideration in the respecification of Model 3.

The large error covariance between items Co2 and Co3 (MI = 65.11, EPC = .54) also remained. Although this suggested that allowing these error terms to correlate would improve the model fit, Hermida (2015) cautions that allowing error terms to correlate post hoc simply to improve model fit is invalid and atheoretical. Brown (2015) highlights that, in certain situations, systematic measurement error may also be present as a result of method effects such as reverse-worded items. However, if that is the case, Brown (2015) emphasizes that the

error terms for all pairs of items for which this method effect applies must be allowed to correlate. In the present model, as there did not appear to be methodological nor theoretical justification for allowing the error terms to correlate, this modification was not made in respecified Model 3.

Respecified Model 3. Items Ca3 and Co2 were deleted in Model 3. The indices of fit indicated an improvement in the model fit, $\chi^2(74) = 204.37$, $p = .01$, TLI = .93, CFI = .94, RMSEA = .11. There were no standardised residual covariance values greater than |2.58| (Byrne, 2001), no items that cross-loaded onto more than one factor, and no standardised item loadings below .50 (Hair et al., 2010). Thus, although the TLI, CFI, and RMSEA values still fell short of the optimal values of > .95, > .95, and < .06, respectively (Hu & Bentler, 1999), Model 3 was taken to be the best-fit model for the purpose of this experiment (see Figure E1).

Standardised item loadings ranged from .73 to .89 for the factor Competence, .84 to .94 for the factor Caring, and .85 to .92 for the factor Character. There was a correlation of .71 between the factors Competence and Caring, .69 between Caring and Character, and .78 between Competence and Character. Given that the factor loadings of the items in the model were fairly consistent (ranging from .73 to .94), for simplicity, each item in the measure was weighted equally in the calculation of the Competence, Caring, and Character subscale scores. The measure of source credibility resulted in Cronbach's coefficient alpha values of .91 for the Competence subscale, .93 for the Caring subscale, .96 for the Character subscale, and .96 for overall Credibility. These reliability estimates are similar to those found in the original validation study by McCroskey and Teven (1999).

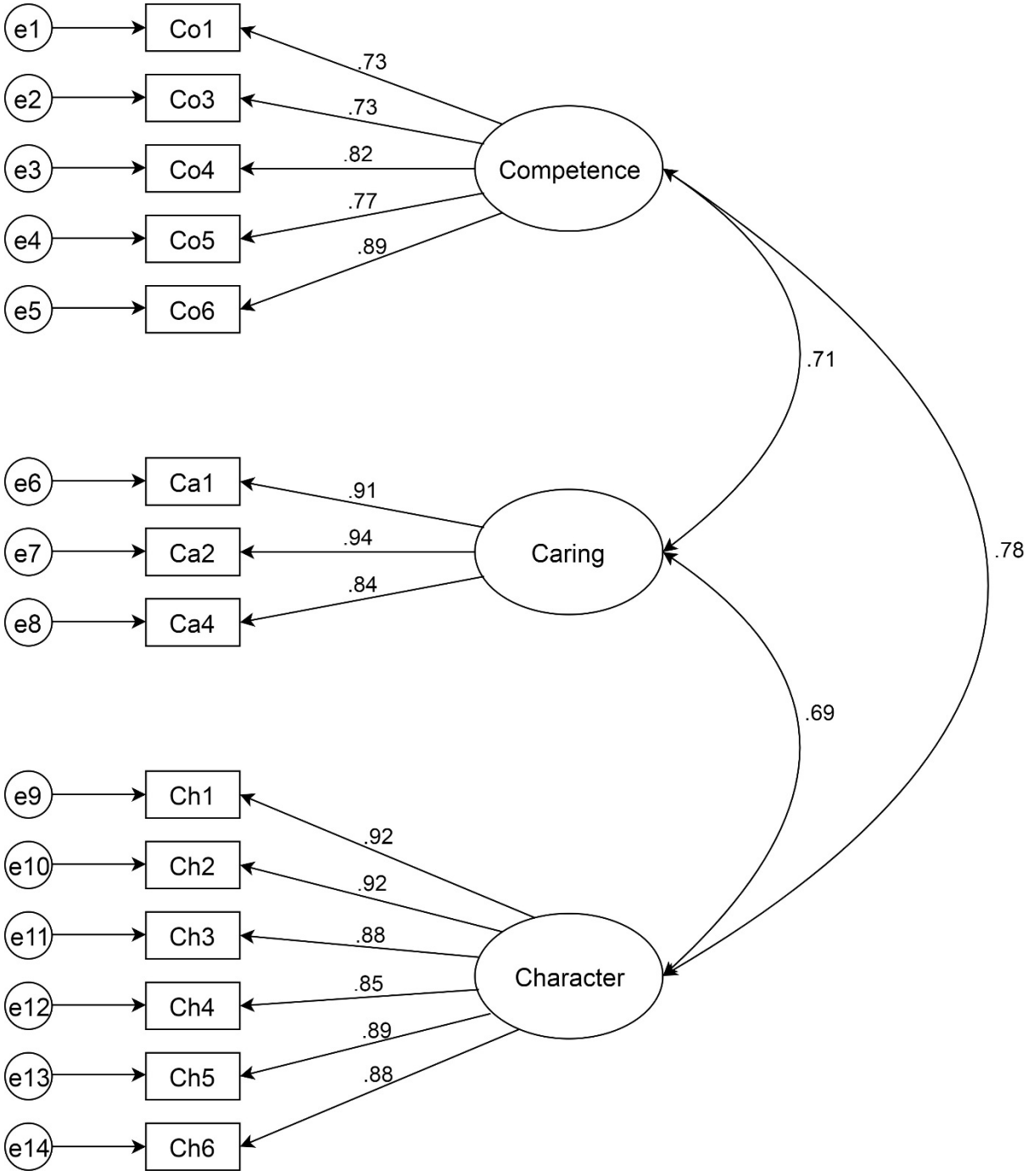

Figure E1. Standardised coefficients for the revised model of McCroskey and Teven's (1999) measure of source credibility (Experiment 1).

Experiment 2

The model fit of McCroskey and Teven's (1999) measure of source credibility was evaluated using the same approach previously described in Experiment 1 (N = 236).[57]

Three-factor model. Estimates of model fit indicated that the model was a poor fit for the data, $\chi^2(132) = 528.64$, $p < .001$, TLI = .82, CFI = .85, RMSEA = .11 (see Table E2). The standardised residual covariance matrix revealed a residual of -3.15 between items Ca3 and Ca4, and 3.92 between items Co2 and Co3, which were indicative of model misfit (Byrne, 2001). Items Ca3 and Ca5 were also found to load poorly onto the factor Caring, with standardised item loadings of .12 and .48, respectively. Examination of the modification indices revealed that in addition to the factor Caring, item Ca6 was cross-loading onto the factor Competence (MI = 7.12, EPC = .17). It was also noted that there was large covariance between several of the error terms, with the largest being between items Co2 and Co3 (MI = 38.01, EPC = .56). Given the presence of large standardised residual values, large error covariance, standardised item loadings below .50, and an item that cross-loaded onto more than one factor, respecification of the model was pursued.

Single-factor model. Given that the three-dimension model of McCroskey and Teven's (1999) source credibility measure did not appear to be a good fit for the data, a single-factor model was evaluated. However, the results indicated that a single-factor model was also a poor fit for the data, $\chi^2(135) = 750.74$, $p < .001$, TLI = .73, CFI = .76, RMSEA = .14. Therefore, respecification of the model was again pursued.

[57] The assumption of univariate normality was violated with multiple standardised values of skewness and kurtosis greater than |2.58|. There was also significant multivariate non-normality, with Mardia's coefficient (measure of multivariate kurtosis) of 206.07 (standardised estimate of 58.99). Thus, bootstrapping (Efron & Tibshirani, 1986) using a total of 2000 bootstrap samples was employed to assess the model fit. The model fit was therefore further assessed using the Bollen-Stine corrected p value instead of the traditional maximum likelihood p value.

Table E2

Goodness-of-Fit Indices for McCroskey and Teven's (1999) Measure of Source Credibility (Experiment 2)

Model	Goodness-of-Fit Measure				
	χ^2	*df*	TLI	CFI	RMSEA
Optimal value [a]	-	-	> .95	> .95	< .06
Hypothesised three-factor model	528.64***	132	.82	.85	.11
Single-factor model	750.74***	135	.73	.76	.14
Respecified Model 2; three-factor model, items Ca3, Ca5 and Ca6 deleted	338.70***	87	.87	.89	.11
Respecified Model 3; three-factor model, item Co2 deleted	274.18***	74	.89	.91	.11

Note. TLI = Tucker-Lewis index; CFI = comparison fit index; RMSEA = root mean square error of approximation.
[a] Hu and Bentler (1999)
**$p \leq .01$, ***$p \leq .001$

Respecified Model 2. Post hoc adjustments were made in an attempt to develop a better-fitting model for use in the present experiment. Following the argument of McCroskey and Teven (1999) that Competence, Caring, and Character are three distinct factors, item Ca6 was deleted from the respecified model analysis. Items Ca3 and Ca5 were also deleted from the model as they did not appear to load strongly onto the factor Caring. There was a slight improvement to the indices of model fit, $\chi^2(87) = 338.70$, $p < .001$, TLI = .87, CFI = .89, RMSEA = .11. A large standardised residual covariance value of 4.01 between items Co2 and Co3 still remained. There was also large covariance between the error terms of items Co2 and Co3 (MI = 38.93, EPC = .57).

Respecified Model 3. Item Co2 was deleted in Model 3. There was a slight improvement to the indices of model fit, $\chi^2(74) = 274.18$, $p = .001$, TLI = .89, CFI = .91,

RMSEA = .11. There were no standardised residual covariance values greater than |2.58| (Byrne, 2001), no items that cross-loaded onto more than one factor, and no standardised item loadings below the recommended value of .50 (Hair et al., 2010). Thus, although the TLI, CFI, and RMSEA values still fell short of the optimal values of > .95, > .95, and < .06, respectively, Model 3 was taken to be the best-fit model for the purpose of this experiment (see Figure E2).

Standardised item loadings ranged from .54 to .85 for the factor Competence, .75 to .80 for the factor Caring, and .74 to .85 for the factor Character. There was a correlation of .68 between the factors Competence and Caring, .75 between Caring and Character, and .79 between Competence and Character. Given that the best-fit model obtained was identical to the best-fit model obtained in Experiment 1, this model was used for all subsequent experiments. With the exception of one item (Co3, with a factor loading of .54), the factor loadings of all items in the present model were relatively homogeneous (ranging from .74 to .85). Therefore, in the interest of maintaining consistency across Experiment 1 and Experiment 2 (and all subsequent experiments), each item in the measure was weighted equally in the calculation of the Competence, Caring, and Character subscale scores. The measure of source credibility resulted in Cronbach's coefficient alpha values of .87 for the Competence subscale, .81 for the Caring subscale, .91 for the Character subscale, and .93 for overall Credibility.

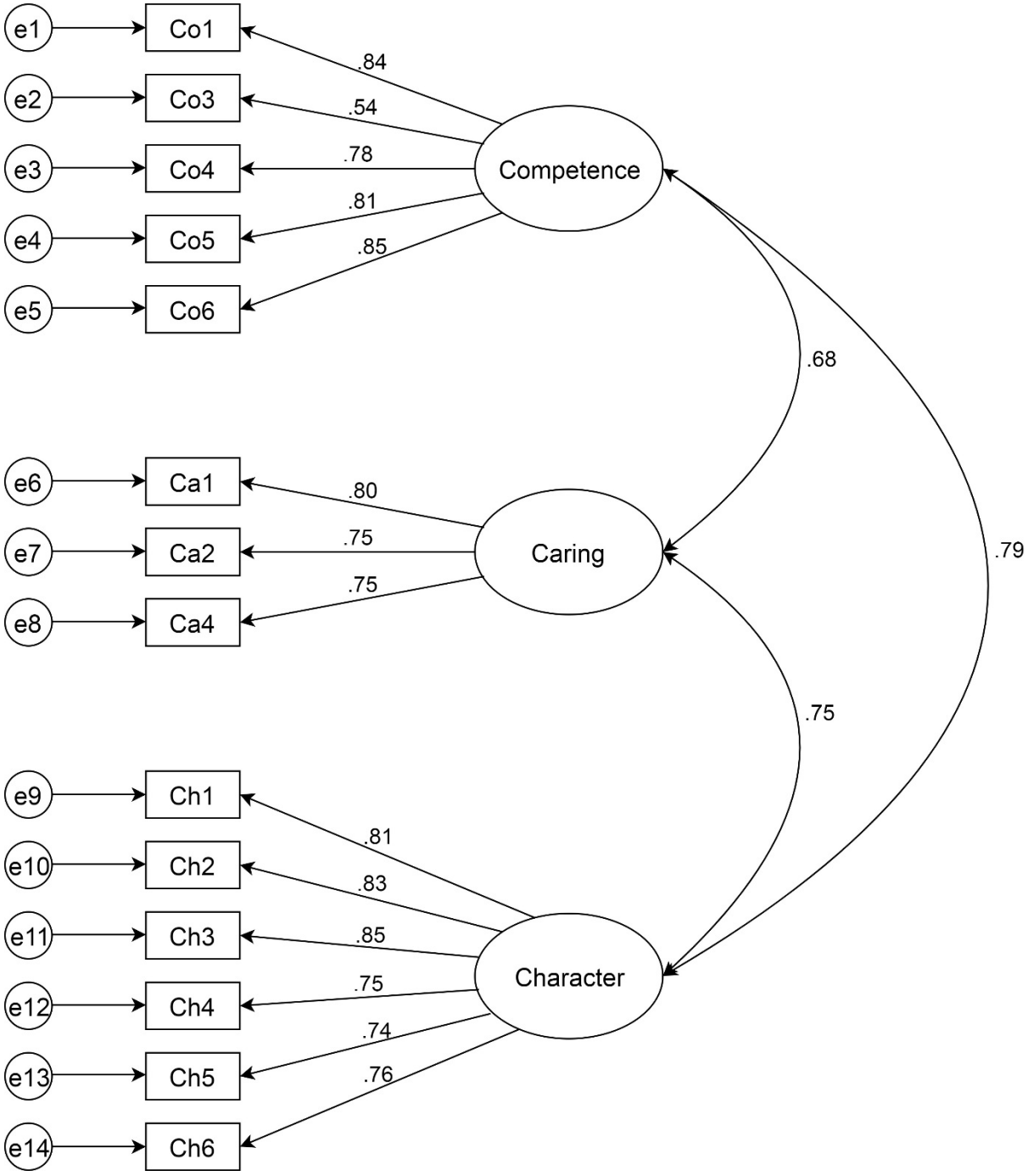

Figure E2. Standardised coefficients for the revised model of McCroskey and Teven's (1999) measure of source credibility (Experiment 2).

Appendix F

Assumptions Testing (Experiment 1)

Table F1

Mean Ratings of Perceived Deception and Values of Skewness and Kurtosis

Condition of ASD Behaviour	Experimental Group	Perceived Deception		Skewness		Kurtosis	
		M	*SD*	Statistic	*SE*	Statistic	*SE*
Gaze Aversion	Experimental Group (Video)	4.35	1.86	-0.25	0.27	-1.02	0.53
	Control Group (Transcript)	5.00	1.67	-0.85	0.27	-0.05	0.53
Repetitive Body Movements	Experimental Group (Video)	4.77	1.76	-0.39	0.27	-1.12	0.53
	Control Group (Transcript)	5.21	1.56	-0.95	0.27	0.28	0.53
Inappropriate Emotional Displays	Experimental Group (Video)	4.71	1.78	-0.42	0.27	-0.96	0.53
	Control Group (Transcript)	4.10	1.81	-0.15	0.27	-0.67	0.53
Literal Interpretation of Figurative Language	Experimental Group (Video)	4.95	1.68	-0.78	0.27	-0.30	0.53
	Control Group (Transcript)	4.72	1.77	-0.54	0.27	-0.67	0.53
Poor Reciprocity	Experimental Group (Video)	5.41	1.64	-0.92	0.27	-0.31	0.53
	Control Group (Transcript)	5.32	1.65	-0.94	0.27	-0.30	0.53
Flat Affect	Experimental Group (Video)	4.25	1.95	-0.30	0.27	-1.17	0.53
	Control Group (Transcript)	4.09	2.06	0.01	0.27	-1.38	0.53
Control Condition	Experimental Group (Video)	5.41	1.56	-1.07	0.27	0.47	0.53
	Control Group (Transcript)	4.78	1.63	-0.56	0.27	-0.47	0.53

Table F2

Mean Ratings of Perceived Deception and Values of Skewness and Kurtosis after Reflected Logarithmic Transformation

Condition of ASD Behaviour	Experimental Group	Perceived Deception		Skewness		Kurtosis	
		M	*SD*	Statistic	*SE*	Statistic	*SE*
Gaze Aversion	Experimental Group (Video)	0.49	0.26	-0.63	0.67	-0.56	0.53
	Control Group (Transcript)	0.41	0.25	-0.15	0.27	-0.77	0.53
Repetitive Body Movements	Experimental Group (Video)	0.43	0.27	-0.34	0.27	-1.01	0.53
	Control Group (Transcript)	0.38	0.25	-0.08	0.27	-0.78	0.53
Inappropriate Emotional Displays	Experimental Group (Video)	0.44	0.27	-0.37	0.27	-0.95	0.53
	Control Group (Transcript)	0.53	0.24	-0.73	0.27	-0.19	0.53
Literal Interpretation of Figurative Language	Experimental Group (Video)	0.42	0.25	-0.18	0.27	-0.75	0.53
	Control Group (Transcript)	0.45	0.26	-0.35	0.27	-0.82	0.53
Poor Reciprocity	Experimental Group (Video)	0.33	0.27	0.19	0.27	-1.19	0.53
	Control Group (Transcript)	0.35	0.26	0.17	0.27	-0.92	0.53
Flat Affect	Experimental Group (Video)	0.50	0.26	-0.53	0.67	-0.61	0.53
	Control Group (Transcript)	0.51	0.29	-0.64	0.27	-0.92	0.53
Control Condition	Experimental Group (Video)	0.34	0.26	0.13	0.27	-0.96	0.53
	Control Group (Transcript)	0.45	0.24	-0.41	0.27	-0.59	0.53

Table F3

Mean Ratings of Perceived Competence and Values of Skewness and Kurtosis

Condition of ASD Behaviour	Experimental Group	Perceived Competence		Skewness		Kurtosis	
		M	*SD*	Statistic	*SE*	Statistic	*SE*
Gaze Aversion	Experimental Group (Video)	19.62	4.44	-0.19	0.27	0.49	0.54
	Control Group (Transcript)	18.59	4.89	-0.29	0.27	-0.09	0.53
Repetitive Body Movements	Experimental Group (Video)	19.86	4.08	-0.06	0.27	-0.41	0.54
	Control Group (Transcript)	18.52	4.84	-0.13	0.27	0.24	0.53
Inappropriate Emotional Displays	Experimental Group (Video)	19.24	5.31	-0.35	0.27	-0.59	0.54
	Control Group (Transcript)	16.89	4.60	-0.10	0.27	-0.39	0.53
Literal Interpretation of Figurative Language	Experimental Group (Video)	18.18	5.32	-0.22	0.27	-0.68	0.54
	Control Group (Transcript)	15.68	5.18	-0.01	0.27	-0.55	0.53
Poor Reciprocity	Experimental Group (Video)	22.76	4.89	-0.78	0.27	0.64	0.54
	Control Group (Transcript)	20.75	5.25	-0.29	0.27	-0.60	0.53
Flat Affect	Experimental Group (Video)	18.09	5.81	-0.39	0.27	-0.49	0.54
	Control Group (Transcript)	17.19	6.12	0.16	0.27	-0.54	0.53
Control Condition	Experimental Group (Video)	21.51	3.82	-0.19	0.27	0.21	0.54
	Control Group (Transcript)	17.62	5.06	-0.10	0.27	-0.47	0.53

Table F4

Mean Ratings of Perceived Caring and Values of Skewness and Kurtosis

Condition of ASD Behaviour	Experimental Group	Perceived Caring		Skewness		Kurtosis	
		M	*SD*	Statistic	*SE*	Statistic	*SE*
Gaze Aversion	Experimental Group (Video)	10.04	3.59	0.37	0.27	-0.45	0.53
	Control Group (Transcript)	10.57	3.35	-0.51	0.27	-0.06	0.53
Repetitive Body Movements	Experimental Group (Video)	11.25	3.06	-0.35	0.27	0.70	0.53
	Control Group (Transcript)	10.81	3.16	-0.27	0.27	0.21	0.53
Inappropriate Emotional Displays	Experimental Group (Video)	11.61	3.55	-0.16	0.27	-0.53	0.53
	Control Group (Transcript)	9.65	3.38	-0.01	0.27	-0.79	0.53
Literal Interpretation of Figurative Language	Experimental Group (Video)	11.67	3.29	-0.40	0.27	0.29	0.53
	Control Group (Transcript)	10.73	3.38	-0.23	0.27	-0.42	0.53
Poor Reciprocity	Experimental Group (Video)	11.44	3.28	-0.30	0.27	-0.21	0.53
	Control Group (Transcript)	10.98	3.46	-0.46	0.27	-0.10	0.53
Flat Affect	Experimental Group (Video)	9.61	3.62	0.05	0.27	-0.40	0.53
	Control Group (Transcript)	9.73	3.92	0.25	0.27	-0.42	0.53
Control Condition	Experimental Group (Video)	12.79	2.71	-0.12	0.27	-0.34	0.53
	Control Group (Transcript)	10.64	3.45	-0.48	0.27	0.06	0.53

Table F5

Mean Ratings of Perceived Character and Values of Skewness and Kurtosis

Condition of ASD Behaviour	Experimental Group	Perceived Character		Skewness		Kurtosis	
		M	*SD*	Statistic	*SE*	Statistic	*SE*
Gaze Aversion	Experimental Group (Video)	22.47	6.62	-0.25	0.27	-0.33	0.54
	Control Group (Transcript)	24.10	6.62	-0.66	0.27	0.55	0.53
Repetitive Body Movements	Experimental Group (Video)	24.91	6.39	-0.30	0.27	-0.33	0.54
	Control Group (Transcript)	25.15	6.21	-0.83	0.27	1.45	0.53
Inappropriate Emotional Displays	Experimental Group (Video)	23.42	7.29	-0.26	0.27	-0.54	0.54
	Control Group (Transcript)	21.57	6.73	-0.02	0.27	-0.51	0.53
Literal Interpretation of Figurative Language	Experimental Group (Video)	25.22	5.34	-0.10	0.27	-0.77	0.54
	Control Group (Transcript)	23.05	6.45	-0.18	0.27	-0.71	0.53
Poor Reciprocity	Experimental Group (Video)	26.31	5.85	-0.69	0.27	0.53	0.54
	Control Group (Transcript)	25.28	5.83	-0.34	0.27	-0.28	0.53
Flat Affect	Experimental Group (Video)	22.18	7.31	-0.09	0.27	-0.51	0.54
	Control Group (Transcript)	20.90	7.68	0.02	0.27	-0.67	0.53
Control Condition	Experimental Group (Video)	27.38	5.32	-0.40	0.27	-0.31	0.54
	Control Group (Transcript)	23.43	6.50	-0.35	0.27	0.01	0.53

Table F6

Mean Ratings of Perceived Deception and Values of Skewness and Kurtosis by Presentation Order

Presentation Order	Condition of ASD Behaviour	Experimental Group	Perceived Deception		Skewness		Kurtosis	
			M	*SD*	Statistic	*SE*	Statistic	*SE*
Deception – Credibility	Gaze Aversion	Experimental Group (Video)	4.32	1.78	-0.10	0.35	-1.01	0.68
		Control Group (Transcript)	4.74	1.71	-0.80	0.35	0.01	0.68
	Repetitive Body Movements	Experimental Group (Video)	4.72	1.73	-0.29	0.35	-1.26	0.68
		Control Group (Transcript)	5.57	1.30	-1.01	0.35	0.80	0.68
	Inappropriate Emotional Displays	Experimental Group (Video)	4.70	1.83	-0.45	0.35	-0.83	0.68
		Control Group (Transcript)	3.74	1.69	0.02	0.35	-0.88	0.68
	Literal Interpretation of Figurative Language	Experimental Group (Video)	5.28	1.54	-1.19	0.35	1.10	0.68
		Control Group (Transcript)	4.98	1.78	-0.70	0.35	-0.55	0.68
	Poor Reciprocity	Experimental Group (Video)	5.40	1.68	-0.97	0.35	-0.13	0.68
		Control Group (Transcript)	5.38	1.53	-1.23	0.35	0.74	0.68
	Flat Affect	Experimental Group (Video)	4.17	1.97	-0.23	0.35	-1.32	0.68
		Control Group (Transcript)	3.77	1.91	0.27	0.35	-1.16	0.68
	Control Condition	Experimental Group (Video)	5.57	1.50	-1.48	0.35	2.11	0.68
		Control Group (Transcript)	5.23	1.45	-0.83	0.35	0.40	0.68

Credibility – Deception	Gaze Aversion	Experimental Group (Video)	4.39	1.98	-0.43	0.41	-1.01	0.80
		Control Group (Transcript)	5.35	1.57	-0.98	0.40	-0.10	0.79
	Repetitive Body Movements	Experimental Group (Video)	4.85	1.82	-0.55	0.41	-0.90	0.80
		Control Group (Transcript)	4.71	1.75	-0.67	0.40	-0.54	0.79
	Inappropriate Emotional Displays	Experimental Group (Video)	4.73	1.74	-0.39	0.41	-1.16	0.80
		Control Group (Transcript)	4.59	1.89	-0.53	0.40	-0.85	0.79
	Literal Interpretation of Figurative Language	Experimental Group (Video)	4.48	1.77	-0.33	0.41	-1.04	0.80
		Control Group (Transcript)	4.35	1.72	-0.44	0.40	-0.59	0.79
	Poor Reciprocity	Experimental Group (Video)	5.42	1.62	-0.89	0.41	-0.49	0.80
		Control Group (Transcript)	5.24	1.83	-0.69	0.40	-1.08	0.79
	Flat Affect	Experimental Group (Video)	4.36	1.93	-0.42	0.41	-0.90	0.80
		Control Group (Transcript)	4.53	2.19	-0.38	0.40	-1.35	0.79
	Control Condition	Experimental Group (Video)	5.18	1.63	-0.64	0.41	-0.75	0.80
		Control Group (Transcript)	4.15	1.67	-0.21	0.40	-0.88	0.79

Table F7

Mean Ratings of Perceived Deception and Values of Skewness and Kurtosis by Presentation Order after Reflected Logarithmic Transformation

Presentation Order	Condition of ASD Behaviour	Experimental Group	Perceived Deception		Skewness		Kurtosis	
			M	*SD*	Statistic	*SE*	Statistic	*SE*
Deception – Credibility	Gaze Aversion	Experimental Group (Video)	0.50	0.26	-0.79	0.35	-0.33	0.68
		Control Group (Transcript)	0.45	0.24	-0.32	0.35	-0.41	0.68
	Repetitive Body Movements	Experimental Group (Video)	0.45	0.26	-0.42	0.35	-0.94	0.68
		Control Group (Transcript)	0.33	0.23	-0.03	0.35	-0.87	0.68
	Inappropriate Emotional Displays	Experimental Group (Video)	0.44	0.27	-0.37	0.35	-0.99	0.68
		Control Group (Transcript)	0.59	0.21	-1.02	0.35	0.92	0.68
	Literal Interpretation of Figurative Language	Experimental Group (Video)	0.37	0.24	0.01	0.35	-0.56	0.68
		Control Group (Transcript)	0.40	0.27	-0.13	0.35	-1.09	0.68
	Poor Reciprocity	Experimental Group (Video)	0.33	0.28	0.20	0.35	-1.19	0.68
		Control Group (Transcript)	0.35	0.24	0.21	0.35	-0.53	0.68
	Flat Affect	Experimental Group (Video)	0.52	0.26	-0.53	0.35	-0.64	0.68
		Control Group (Transcript)	0.56	0.26	-1.02	0.35	0.03	0.68
	Control Condition	Experimental Group (Video)	0.31	0.25	0.28	0.35	-0.62	0.68
		Control Group (Transcript)	0.38	0.24	-0.22	0.35	-0.75	0.68

Credibility – Deception	Gaze Aversion	Experimental Group (Video)	0.48	0.27	-0.45	0.41	-0.72	0.80
		Control Group (Transcript)	0.35	0.25	0.11	0.40	-0.91	0.79
	Repetitive Body Movements	Experimental Group (Video)	0.42	0.28	-0.25	0.41	-1.06	0.80
		Control Group (Transcript)	0.45	0.25	-0.27	0.40	-0.58	0.79
	Inappropriate Emotional Displays	Experimental Group (Video)	0.45	0.26	-0.37	0.41	-0.86	0.80
		Control Group (Transcript)	0.46	0.27	-0.32	0.40	-0.84	0.79
	Literal Interpretation of Figurative Language	Experimental Group (Video)	0.48	0.25	-0.54	0.41	-0.50	0.80
		Control Group (Transcript)	0.51	0.23	-0.63	0.40	0.05	0.79
	Poor Reciprocity	Experimental Group (Video)	0.33	0.27	0.18	0.41	-1.19	0.80
		Control Group (Transcript)	0.35	0.30	0.15	0.40	-1.45	0.79
	Flat Affect	Experimental Group (Video)	0.49	0.27	-0.56	0.41	-0.49	0.80
		Control Group (Transcript)	0.44	0.31	-0.19	0.40	-1.45	0.79
	Control Condition	Experimental Group (Video)	0.27	0.27	-0.11	0.41	-1.19	0.80
		Control Group (Transcript)	0.54	0.22	-0.76	0.40	0.29	0.79

Table F8

Mean Ratings of Perceived Competence and Values of Skewness and Kurtosis by Presentation Order

Presentation Order	Condition of ASD Behaviour	Experimental Group	Perceived Competence		Skewness		Kurtosis	
			M	*SD*	Statistic	*SE*	Statistic	*SE*
Deception – Credibility	Gaze Aversion	Experimental Group (Video)	19.66	5.10	-0.24	0.35	0.11	0.68
		Control Group (Transcript)	17.51	5.22	0.13	0.35	0.05	0.68
	Repetitive Body Movements	Experimental Group (Video)	19.30	4.10	0.19	0.35	0.28	0.68
		Control Group (Transcript)	20.32	4.32	0.04	0.35	0.25	0.68
	Inappropriate Emotional Displays	Experimental Group (Video)	19.62	5.24	-0.47	0.35	-0.40	0.68
		Control Group (Transcript)	16.40	4.57	-0.11	0.35	-0.12	0.68
	Literal Interpretation of Figurative Language	Experimental Group (Video)	18.60	4.99	-0.10	0.35	-0.30	0.68
		Control Group (Transcript)	15.32	5.23	0.03	0.35	-0.24	0.68
	Poor Reciprocity	Experimental Group (Video)	22.21	5.05	-0.34	0.35	-0.37	0.68
		Control Group (Transcript)	20.47	5.20	-0.49	0.35	-0.38	0.68
	Flat Affect	Experimental Group (Video)	17.87	5.97	-0.45	0.35	-0.62	0.68
		Control Group (Transcript)	15.72	5.80	0.36	0.35	-0.33	0.68
	Control Condition	Experimental Group (Video)	21.51	3.80	-0.01	0.35	0.46	0.68
		Control Group (Transcript)	18.96	4.60	0.04	0.35	-0.78	0.68

Credibility – Deception	Gaze Aversion	Experimental Group (Video)	19.67	3.30	0.03	0.41	0.01	0.80
		Control Group (Transcript)	20.09	3.99	-0.91	0.41	0.82	0.79
	Repetitive Body Movements	Experimental Group (Video)	20.33	4.41	-0.67	0.41	-0.23	0.80
		Control Group (Transcript)	16.03	4.43	-0.32	0.40	0.06	0.79
	Inappropriate Emotional Displays	Experimental Group (Video)	18.61	5.38	-0.16	0.41	-0.66	0.80
		Control Group (Transcript)	17.56	4.63	-0.11	0.40	-0.66	0.79
	Literal Interpretation of Figurative Language	Experimental Group (Video)	17.48	5.71	-0.23	0.41	-1.13	0.80
		Control Group (Transcript)	16.18	5.16	-0.06	0.40	-0.91	0.79
	Poor Reciprocity	Experimental Group (Video)	23.00	5.56	-1.81	0.41	3.90	0.80
		Control Group (Transcript)	21.15	5.38	-0.05	0.40	-0.95	0.79
	Flat Affect	Experimental Group (Video)	18.48	5.57	-0.32	0.41	-0.13	0.80
		Control Group (Transcript)	19.21	6.05	-0.14	0.40	-0.26	0.79
	Control Condition	Experimental Group (Video)	21.36	3.91	-0.36	0.41	-0.08	0.80
		Control Group (Transcript)	15.76	5.16	-0.01	0.40	-0.48	0.79

Table F9

Mean Ratings of Perceived Competence and Values of Skewness and Kurtosis by Presentation Order after Reflected Square Root Transformation

Presentation Order	Condition of ASD Behaviour	Experimental Group	Perceived Competence		Skewness		Kurtosis	
			M	*SD*	Statistic	*SE*	Statistic	*SE*
Deception – Credibility	Gaze Aversion	Experimental Group (Video)	3.27	0.83	-0.66	0.35	0.93	0.68
		Control Group (Transcript)	3.59	0.78	-0.81	0.35	0.73	0.68
	Repetitive Body Movements	Experimental Group (Video)	3.36	0.67	-1.09	0.35	2.45	0.68
		Control Group (Transcript)	3.18	0.74	-0.90	0.35	1.33	0.68
	Inappropriate Emotional Displays	Experimental Group (Video)	3.28	0.80	-0.09	0.35	-0.30	0.68
		Control Group (Transcript)	3.77	0.62	-0.32	0.35	-0.15	0.68
	Literal Interpretation of Figurative Language	Experimental Group (Video)	3.44	0.77	-0.69	0.35	1.13	0.68
		Control Group (Transcript)	3.90	0.70	-0.52	0.35	0.15	0.68
	Poor Reciprocity	Experimental Group (Video)	2.81	0.94	-0.42	0.35	-0.32	0.68
		Control Group (Transcript)	3.14	0.82	-0.04	0.35	-0.57	0.68
	Flat Affect	Experimental Group (Video)	3.53	0.84	-0.06	0.35	-0.37	0.68
		Control Group (Transcript)	3.82	0.84	-1.08	0.35	1.57	0.68
	Control Condition	Experimental Group (Video)	3.00	0.69	-0.94	0.35	1.66	0.68
		Control Group (Transcript)	3.40	0.70	-0.44	0.35	-0.47	0.68

Credibility – Deception	Gaze Aversion	Experimental Group (Video)	3.33	0.51	-0.49	0.41	0.35	0.80
		Control Group (Transcript)	3.25	0.59	0.46	0.40	0.02	0.79
	Repetitive Body Movements	Experimental Group (Video)	3.20	0.66	0.33	0.41	-0.77	0.80
		Control Group (Transcript)	3.83	0.58	-0.10	0.40	-0.08	0.79
	Inappropriate Emotional Displays	Experimental Group (Video)	3.43	0.81	-0.39	0.41	-0.17	0.80
		Control Group (Transcript)	3.61	0.65	-0.25	0.40	-0.59	0.79
	Literal Interpretation of Figurative Language	Experimental Group (Video)	3.59	0.79	0.003	0.41	-1.37	0.80
		Control Group (Transcript)	3.79	0.69	-0.26	0.40	-0.69	0.79
	Poor Reciprocity	Experimental Group (Video)	2.68	0.90	0.72	0.41	1.35	0.80
		Control Group (Transcript)	2.99	0.96	-0.52	0.40	-0.54	0.79
	Flat Affect	Experimental Group (Video)	3.44	0.83	-0.32	0.41	-0.002	0.80
		Control Group (Transcript)	3.29	0.10	-0.69	0.40	0.29	0.79
	Control Condition	Experimental Group (Video)	3.04	0.65	-0.22	0.41	-0.03	0.80
		Control Group (Transcript)	3.84	0.69	-0.41	0.40	-0.19	0.79

Table F10

Mean Ratings of Perceived Caring and Values of Skewness and Kurtosis by Presentation Order

Presentation Order	Condition of ASD Behaviour	Experimental Group	Perceived Caring		Skewness		Kurtosis	
			M	*SD*	Statistic	*SE*	Statistic	*SE*
Deception – Credibility	Gaze Aversion	Experimental Group (Video)	9.81	3.61	0.43	0.35	-0.67	0.68
		Control Group (Transcript)	9.98	3.58	-0.29	0.35	-0.36	0.68
	Repetitive Body Movements	Experimental Group (Video)	10.89	3.12	-0.24	0.35	0.43	0.68
		Control Group (Transcript)	11.57	3.26	-0.46	0.35	0.82	0.68
	Inappropriate Emotional Displays	Experimental Group (Video)	11.64	3.76	-0.35	0.35	-0.48	0.68
		Control Group (Transcript)	9.40	3.22	0.22	0.35	0.87	0.68
	Literal Interpretation of Figurative Language	Experimental Group (Video)	11.53	3.49	-0.48	0.35	0.36	0.68
		Control Group (Transcript)	11.30	3.51	-0.22	0.35	-0.70	0.68
	Poor Reciprocity	Experimental Group (Video)	10.91	3.72	-0.04	0.35	-0.12	0.68
		Control Group (Transcript)	11.64	3.20	-0.51	0.35	-0.12	0.68
	Flat Affect	Experimental Group (Video)	8.74	3.63	0.41	0.35	-0.28	0.68
		Control Group (Transcript)	8.81	3.75	0.38	0.35	-0.33	0.68
	Control Condition	Experimental Group (Video)	12.70	2.73	-0.36	0.35	-0.15	0.68
		Control Group (Transcript)	11.23	3.12	-0.51	0.35	0.58	0.68

Credibility – Deception	Gaze Aversion	Experimental Group (Video)	10.36	3.59	0.32	0.41	0.06	0.80
		Control Group (Transcript)	11.38	2.84	-0.73	0.40	0.88	0.79
	Repetitive Body Movements	Experimental Group (Video)	11.76	2.94	-0.53	0.41	1.80	0.80
		Control Group (Transcript)	9.76	2.72	-0.46	0.40	-0.79	0.79
	Inappropriate Emotional Displays	Experimental Group (Video)	11.58	3.29	0.26	0.41	-0.64	0.80
		Control Group (Transcript)	10.00	3.61	-0.30	0.40	-0.55	0.79
	Literal Interpretation of Figurative Language	Experimental Group (Video)	11.88	3.01	-0.13	0.41	-0.06	0.80
		Control Group (Transcript)	9.94	3.07	-0.54	0.40	-0.04	0.79
	Poor Reciprocity	Experimental Group (Video)	12.18	3.54	0.72	0.41	0.38	0.80
		Control Group (Transcript)	10.06	3.65	-0.32	0.40	-0.04	0.79
	Flat Affect	Experimental Group (Video)	10.85	3.27	-0.37	0.41	0.82	0.80
		Control Group (Transcript)	11.00	3.85	0.11	0.40	-0.24	0.79
	Control Condition	Experimental Group (Video)	12.91	2.73	0.23	0.41	-0.62	0.80
		Control Group (Transcript)	9.82	3.75	-0.31	0.40	-0.36	0.79

Table F11

Mean Ratings of Perceived Character and Values of Skewness and Kurtosis by Presentation Order

Presentation Order	Condition of ASD Behaviour	Experimental Group	Perceived Character		Skewness		Kurtosis	
			M	*SD*	Statistic	*SE*	Statistic	*SE*
Deception – Credibility	Gaze Aversion	Experimental Group (Video)	22.13	7.09	-0.19	0.35	-0.22	0.68
		Control Group (Transcript)	22.89	7.09	-0.61	0.35	0.38	0.69
	Repetitive Body Movements	Experimental Group (Video)	24.28	6.12	-0.17	0.35	-0.24	0.68
		Control Group (Transcript)	27.11	5.32	-0.30	0.35	0.003	0.69
	Inappropriate Emotional Displays	Experimental Group (Video)	23.68	8.09	-0.41	0.35	-0.73	0.68
		Control Group (Transcript)	20.09	6.14	0.15	0.35	-0.49	0.69
	Literal Interpretation of Figurative Language	Experimental Group (Video)	25.70	5.56	-0.08	0.35	-0.48	0.68
		Control Group (Transcript)	23.63	7.02	-0.42	0.35	-0.80	0.69
	Poor Reciprocity	Experimental Group (Video)	26.04	5.68	-0.50	0.35	0.14	0.68
		Control Group (Transcript)	26.02	5.74	-0.23	0.35	-0.75	0.69
	Flat Affect	Experimental Group (Video)	21.32	7.68	0.09	0.35	-0.57	0.68
		Control Group (Transcript)	19.36	7.42	0.21	0.35	-0.54	0.68
	Control Condition	Experimental Group (Video)	27.87	5.07	-0.43	0.35	-0.11	0.68
		Control Group (Transcript)	25.09	5.78	-0.15	0.35	-0.62	0.69

Credibility – Deception	Gaze Aversion	Experimental Group (Video)	22.79	6.15	-0.34	0.41	-0.89	0.80
		Control Group (Transcript)	26.09	5.21	-0.27	0.40	-0.06	0.79
	Repetitive Body Movements	Experimental Group (Video)	25.52	6.72	-0.42	0.41	-0.29	0.80
		Control Group (Transcript)	23.06	5.83	-1.14	0.40	1.91	0.79
	Inappropriate Emotional Displays	Experimental Group (Video)	23.64	6.32	0.12	0.41	-0.33	0.80
		Control Group (Transcript)	23.62	7.13	-0.44	0.40	-0.11	0.79
	Literal Interpretation of Figurative Language	Experimental Group (Video)	24.48	5.62	-0.18	0.41	-1.05	0.80
		Control Group (Transcript)	22.32	5.69	0.16	0.40	-0.31	0.79
	Poor Reciprocity	Experimental Group (Video)	25.85	6.91	-0.85	0.41	0.33	0.80
		Control Group (Transcript)	24.15	5.89	-0.44	0.40	0.22	0.79
	Flat Affect	Experimental Group (Video)	22.48	7.56	-0.48	0.41	-0.19	0.80
		Control Group (Transcript)	23.03	7.64	-0.29	0.40	-0.37	0.79
	Control Condition	Experimental Group (Video)	26.67	5.95	-0.24	0.41	-0.70	0.80
		Control Group (Transcript)	21.71	6.37	-0.19	0.40	0.12	0.79

Appendix G

Scripts for Stimulus Videos (Experiment 2)

Gaze Aversion, Repetitive Body Movements, Inappropriate Emotional Displays, Poor Reciprocity, Flat Affect, and Control Conditions

Interviewer:	Where did you go to high school?
Target Individual:	I went to high school in Perth, Western Australia. It was an all-boys (all-girls) school called Wesley College (Penrhos College). I was there from year 8 until year 12. Year 8 was in the middle school, Year 9 to 12 were in the high school, Year 12 being the last year of schooling.
Interviewer:	What did you like most about school?
Target Individual:	I liked the subjects that I chose, particularly the music and drama programs. There were lots of opportunities to get involved and perform. I was in a production of Macbeth where I played Macduff, and I was also in a production of Little Shop of Horrors as one of the leads. My friends and I also used to sing with the school jazz band. We would do songs from the Blues Brothers, and we even went on tour to Kuala Lumpur once to perform.
Interviewer:	What did you like least about school?
Target Individual:	I liked least the compulsory sport that we had to do at my school. We had to do a sport both in the summer and in the winter. In summer you could do tennis, volleyball, badminton, and swimming. In winter you could do soccer, AFL, rugby and athletics. In summer, I played volleyball because I was tall, and I was okay at it, but I was a bit uncoordinated. In winter, I played soccer and I was the goalkeeper, but I wasn't very good. And I was always coerced into doing athletics as well, particularly the long jump, but I wasn't very good at that either.
Interviewer:	When you were at school, would you describe yourself as the class clown?
Target Individual:	No, I wouldn't describe myself as the class clown. I was a chatty and inquisitive student but I wouldn't say I was the class clown. Maybe my English literature teacher would disagree. My friend Sam and I would often make jokes and laugh in his class, but I would say that Sam was the class clown, not me.

Literal Interpretation of Figurative Language Condition

Interviewer:	Where did you go to high school?
Target Individual:	I went to high school in Perth, Western Australia. Perth is a city in the south west of Western Australia on the banks of the Swan River. My school was in south Perth.
Interviewer:	What did you like most about school?
Target Individual:	I liked the school buildings. There was a high school at the top of the hill, a junior school at the bottom of the hill, and a middle school in the middle. Some of the buildings were old, some of them were new. My classes were often on the top floor.
Interviewer:	What did you like least about school?
Target Individual:	I didn't like how far away the school was from my house. I used to have to travel on my bike 30 minutes every day. Perth is very windy, so that was inconvenient.
Interviewer:	When you were at school, would you describe yourself as the class clown?
Target Individual:	There weren't any clowns at my school. We weren't taught how to be clowns. I don't think that there are many schools in Perth for clowns.

Appendix H

Assumptions Testing (Experiment 2: Preliminary Study)

Table H1

Mean Ratings of Perceived Gaze Aversion and Values of Skewness and Kurtosis

Condition of ASD Behaviour	Perceived Gaze Aversion		Skewness		Kurtosis	
	M	*SD*	Statistic	*SE*	Statistic	*SE*
Gaze Aversion	5.16	1.02	-0.92	0.41	-0.35	0.81
Repetitive Body Movements	2.72	1.32	-0.11	0.54	-1.27	1.04
Inappropriate Emotional Displays	2.95	1.40	0.09	0.50	-1.10	0.97
Literal Interpretation of Figurative Language	2.87	1.33	0.65	0.48	-0.22	0.94
Poor Reciprocity	2.53	1.57	0.79	0.43	-0.28	0.83
Flat Affect	2.86	1.51	0.12	0.43	-1.36	0.85
Control Condition	2.67	1.39	0.65	0.45	-0.19	0.87

Table H2

Mean Ratings of Perceived Repetitive Body Movements and Values of Skewness and Kurtosis

Condition of ASD Behaviour	Perceived Body Movements		Skewness		Kurtosis	
	M	*SD*	Statistic	*SE*	Statistic	*SE*
Gaze Aversion	3.28	1.65	0.16	0.41	-1.29	0.81
Repetitive Body Movements	4.94	1.11	-1.04	0.54	1.24	1.04
Inappropriate Emotional Displays	3.38	1.50	0.35	0.50	-0.46	0.97
Literal Interpretation of Figurative Language	3.48	1.20	-0.55	0.48	-0.22	0.94
Poor Reciprocity	3.23	1.36	-0.19	0.43	-1.07	0.83
Flat Affect	3.03	1.57	-0.12	0.43	-1.53	0.85
Control Condition	3.63	1.21	0.09	0.45	-1.15	0.87

Table H3

Mean Ratings of Perceived Literal Interpretation of Figurative Language and Values of Skewness and Kurtosis

Condition of ASD Behaviour	Perceived Literal Interpretation		Skewness		Kurtosis	
	M	*SD*	Statistic	*SE*	Statistic	*SE*
Gaze Aversion	2.53	1.50	0.70	0.41	-0.33	0.81
Repetitive Body Movements	2.61	1.58	0.83	0.54	-0.37	1.04
Inappropriate Emotional Displays	2.48	1.75	0.85	0.50	-0.53	0.97
Literal Interpretation of Figurative Language	4.65	1.34	-0.67	0.48	-0.67	0.94
Poor Reciprocity	2.40	1.57	1.18	0.43	0.65	0.83
Flat Affect	2.69	1.58	0.61	0.43	-0.63	0.85
Control Condition	2.89	1.81	0.43	0.45	-1.47	0.87

Table H4

Mean Ratings of Perceived Flat Affect and Values of Skewness and Kurtosis

Condition of ASD Behaviour	Perceived Flat Affect		Skewness		Kurtosis	
	M	*SD*	Statistic	*SE*	Statistic	*SE*
Gaze Aversion	3.87	1.52	-0.48	0.41	-0.72	0.81
Repetitive Body Movements	2.61	1.15	0.62	0.54	-0.58	1.04
Inappropriate Emotional Displays	2.57	0.93	-0.23	0.50	-0.59	0.97
Literal Interpretation of Figurative Language	3.17	1.59	0.36	0.48	-1.06	0.94
Poor Reciprocity	3.53	1.38	0.26	0.43	-0.84	0.83
Flat Affect	4.00	1.54	-0.38	0.43	-0.91	0.85
Control Condition	2.63	1.01	-0.14	0.45	-0.97	0.87

Table H5

Mean Ratings of Perceived Inappropriate Emotional Displays and Values of Skewness and Kurtosis

Condition of ASD Behaviour	Inappropriate Emotion		Skewness		Kurtosis	
	M	*SD*	Statistic	*SE*	Statistic	*SE*
Gaze Aversion	2.59	1.24	0.74	0.41	0.45	0.81
Repetitive Body Movements	2.22	1.26	1.70	0.54	3.83	1.04
Inappropriate Emotional Displays	2.33	1.11	0.71	0.50	0.17	0.97
Literal Interpretation of Figurative Language	2.78	1.28	0.73	0.48	0.43	0.94
Poor Reciprocity	2.17	1.02	0.48	0.43	-0.80	0.83
Flat Affect	2.93	1.16	-0.004	0.43	-0.42	0.85
Control Condition	1.96	0.85	0.47	0.45	-0.47	0.87

Table H6

Mean Ratings of Perceived Inappropriate Emotional Displays and Values of Skewness and Kurtosis after Logarithmic Transformation

Condition of ASD Behaviour	Inappropriate Emotion		Skewness		Kurtosis	
	M	*SD*	Statistic	*SE*	Statistic	*SE*
Gaze Aversion	0.36	0.22	-0.32	0.41	-0.59	0.81
Repetitive Body Movements	0.29	0.23	0.26	0.54	-0.18	1.04
Inappropriate Emotional Displays	0.32	0.22	-0.23	0.50	-0.81	0.97
Literal Interpretation of Figurative Language	0.40	0.21	-0.41	0.48	-0.14	0.94
Poor Reciprocity	0.29	0.22	-0.16	0.43	-1.24	0.83
Flat Affect	0.43	0.21	-0.97	0.43	0.28	0.85
Control Condition	0.25	0.20	-0.15	0.45	-1.30	0.87

Table H7

Mean Ratings of Perceived Poor Reciprocity and Values of Skewness and Kurtosis

Condition of ASD Behaviour	Perceived Poor Reciprocity		Skewness		Kurtosis	
	M	*SD*	Statistic	*SE*	Statistic	*SE*
Gaze Aversion	2.22	1.18	1.41	0.41	2.60	0.81
Repetitive Body Movements	2.06	0.87	0.48	0.24	-0.19	1.04
Inappropriate Emotional Displays	2.14	1.28	1.46	0.50	2.85	0.97
Literal Interpretation of Figurative Language	2.13	1.14	0.53	0.48	-1.13	0.94
Poor Reciprocity	4.63	1.47	-0.56	0.43	-1.24	0.83
Flat Affect	2.17	1.37	1.12	0.43	0.85	0.85
Control Condition	1.59	0.80	1.40	0.45	1.85	0.87

Table H8

Mean Ratings of Perceived Poor Reciprocity and Values of Skewness and Kurtosis after Square Root Transformation

Condition of ASD Behaviour	Perceived Poor Reciprocity		Skewness		Kurtosis	
	M	*SD*	Statistic	*SE*	Statistic	*SE*
Gaze Aversion	1.44	0.37	0.71	0.41	0.55	0.81
Repetitive Body Movements	1.40	0.31	0.07	0.54	-0.73	1.04
Inappropriate Emotional Displays	1.41	0.41	0.79	0.50	0.41	0.97
Literal Interpretation of Figurative Language	1.41	0.39	0.29	0.48	-1.40	0.94
Poor Reciprocity	2.12	0.37	-0.71	0.43	-0.92	0.83
Flat Affect	1.41	0.44	0.66	0.43	-0.56	0.85
Control Condition	1.23	0.29	1.00	0.45	0.24	0.87

Appendix I

Assumptions Testing (Experiment 2)

Table I1

Mean Ratings of Perceived Deception and Values of Skewness and Kurtosis

Condition of ASD Behaviour	Perceived Deception		Skewness		Kurtosis	
	M	*SD*	Statistic	*SE*	Statistic	*SE*
Gaze Aversion	4.37	1.57	-0.76	0.40	-0.59	0.78
Repetitive Body Movements	4.43	1.37	-0.99	0.39	0.61	0.76
Literal Interpretation of Figurative Language	4.37	1.76	-1.10	0.36	-0.20	0.71
Poor Reciprocity	4.00	1.80	-0.48	0.41	-1.30	0.80
Flat Affect	4.41	1.53	-0.98	0.36	0.07	0.70
Control Condition	4.71	1.43	-1.20	0.40	0.53	0.78

Table I2

Mean Ratings of Perceived Competence and Values of Skewness and Kurtosis

Condition of ASD Behaviour	Perceived Competence		Skewness		Kurtosis	
	M	*SD*	Statistic	*SE*	Statistic	*SE*
Gaze Aversion	30.88	6.34	-0.67	0.36	0.74	0.71
Repetitive Body Movements	31.81	4.92	-0.49	0.39	1.46	0.76
Literal Interpretation of Figurative Language	27.09	7.86	0.04	0.36	-0.72	0.71
Poor Reciprocity	30.59	6.28	-0.01	0.39	-0.93	0.76
Flat Affect	30.00	5.08	0.13	0.39	0.10	0.76
Control Condition	31.38	6.00	-0.33	0.38	-0.47	0.74

Table I3

Mean Ratings of Perceived Caring and Values of Skewness and Kurtosis

Condition of ASD Behaviour	Perceived Caring		Skewness		Kurtosis	
	M	*SD*	Statistic	*SE*	Statistic	*SE*
Gaze Aversion	28.12	5.48	0.23	0.36	0.10	0.71
Repetitive Body Movements	30.86	5.03	-0.13	0.39	1.21	0.76
Literal Interpretation of Figurative Language	26.35	6.29	0.31	0.36	-0.10	0.71
Poor Reciprocity	29.38	6.37	0.41	0.39	-0.66	0.76
Flat Affect	27.03	5.61	-0.21	0.39	0.13	0.76
Control Condition	30.56	5.96	-0.15	0.38	-0.36	0.74

Table I4

Mean Ratings of Perceived Character and Values of Skewness and Kurtosis

Condition of ASD Behaviour	Perceived Character		Skewness		Kurtosis	
	M	*SD*	Statistic	*SE*	Statistic	*SE*
Gaze Aversion	31.05	8.34	-0.67	0.36	-0.18	0.71
Repetitive Body Movements	32.92	5.68	-1.03	0.39	1.72	0.76
Literal Interpretation of Figurative Language	30.19	6.93	-0.15	0.36	-0.78	0.71
Poor Reciprocity	32.27	7.18	-0.21	0.39	-1.24	0.76
Flat Affect	30.68	5.77	0.001	0.39	-1.14	0.76
Control Condition	33.79	6.26	-0.88	0.38	0.35	0.74

Appendix J

Assumptions Testing (Experiment 3)

Table J1

Mean Ratings of Perceived Deception and Values of Skewness and Kurtosis

Condition of ASD Behaviour	Perceived Deception		Skewness		Kurtosis	
	M	*SD*	Statistic	*SE*	Statistic	*SE*
Gaze Aversion	4.69	1.18	-1.37	0.41	2.33	0.81
Repetitive Body Movements	4.83	1.20	-1.38	0.40	2.21	0.78
Literal Interpretation of Figurative Language	3.95	1.81	-0.48	0.39	-1.32	0.76
Poor Reciprocity	4.94	1.19	-1.27	0.39	1.08	0.77
Flat Affect	4.70	1.45	-1.01	0.41	0.15	0.80
Control Condition	5.12	1.25	-2.02	0.40	4.00	0.79

Table J2

Mean Ratings of Perceived Deception and Values of Skewness and Kurtosis after Reflected Logarithmic Transformation

Condition of ASD Behaviour	Perceived Deception		Skewness		Kurtosis	
	M	*SD*	Statistic	*SE*	Statistic	*SE*
Gaze Aversion	0.50	0.14	0.43	0.41	0.12	0.81
Repetitive Body Movements	0.48	0.15	0.52	0.40	-0.19	0.78
Literal Interpretation of Figurative Language	0.57	0.20	0.09	0.39	-1.38	0.76
Poor Reciprocity	0.46	0.15	0.64	0.39	-0.44	0.77
Flat Affect	0.48	0.18	0.47	0.41	-1.00	0.80
Control Condition	0.43	0.15	1.20	0.40	1.08	0.79

Table J3

Mean Ratings of Perceived Competence and Values of Skewness and Kurtosis

Condition of ASD Behaviour	Perceived Competence		Skewness		Kurtosis	
	M	*SD*	Statistic	*SE*	Statistic	*SE*
Gaze Aversion	24.14	6.25	-1.20	0.39	1.52	0.76
Repetitive Body Movements	25.49	5.07	-0.25	0.39	-0.92	0.76
Literal Interpretation of Figurative Language	23.97	5.98	-0.16	0.38	-1.10	0.75
Poor Reciprocity	24.89	4.78	-0.21	0.38	-0.19	0.75
Flat Affect	24.61	4.83	-0.02	0.42	-0.65	0.82
Control Condition	28.34	3.83	-0.18	0.40	-0.78	0.78

Table J4

Mean Ratings of Perceived Caring and Values of Skewness and Kurtosis

Condition of ASD Behaviour	Perceived Caring		Skewness		Kurtosis	
	M	*SD*	Statistic	*SE*	Statistic	*SE*
Gaze Aversion	12.11	4.84	-0.20	0.39	-0.70	0.76
Repetitive Body Movements	13.70	4.24	-0.75	0.39	0.18	0.76
Literal Interpretation of Figurative Language	13.55	3.70	0.40	0.38	-0.16	0.75
Poor Reciprocity	13.45	3.87	-0.42	0.38	-0.53	0.75
Flat Affect	11.94	3.85	0.20	0.42	-0.11	0.82
Control Condition	15.20	3.28	0.24	0.40	-0.64	0.78

Table J5

Mean Ratings of Perceived Character and Values of Skewness and Kurtosis

Condition of ASD Behaviour	Perceived Character		Skewness		Kurtosis	
	M	*SD*	Statistic	*SE*	Statistic	*SE*
Gaze Aversion	30.35	6.23	-0.50	0.39	0.32	0.76
Repetitive Body Movements	31.49	7.13	-0.50	0.39	-0.95	0.76
Literal Interpretation of Figurative Language	32.11	5.74	-0.31	0.38	0.001	0.75
Poor Reciprocity	30.47	7.28	-0.37	0.38	-0.48	0.75
Flat Affect	30.23	6.60	-0.08	0.42	-0.90	0.82
Control Condition	35.54	5.52	-0.76	0.40	-0.35	0.78

Appendix K

Scripts for Stimulus Videos (Experiment 4)

Gaze Aversion, Repetitive Body Movements, Flat Affect, and Control Conditions

Interviewer:	I am now going to ask you some questions. Please answer all questions truthfully, to the best of your ability. In the room there was an envelope. Did you see this envelope when you were there?
Target Individual:	Yeah, I did.
Interviewer:	Where was it located?
Target Individual:	It was on the table.
Interviewer:	Do you know what was inside the envelope?
Target Individual:	I was told there was money in it.
Interviewer:	Can you describe the person who told you this?
Target Individual:	Uhm, well, she was a young lady… had long hair… was wearing glasses… and… about average height?
Interviewer:	Do you know how much money was inside the envelope?
Target Individual:	She said there was $20.
Interviewer:	Were you told that participants could take the money at any time during the study?
Target Individual:	Yes.
Interviewer:	Were you told that participants would be paid $50 if they took the money but could successfully convince the interviewer that they did not?
Target Individual:	Yes.
Interviewer:	Were you told that participants would only be paid $10 if they took the money but were judged by the interviewer as lying?
Target Individual:	Yes.
Interviewer:	Were you told that participants would be paid $20 if they chose not to take the money, irrespective of whether they were judged as lying or being truthful?

Target Individual: Yes.

Interviewer: Can you describe what you did after the researcher left the room?

Target Individual: I was told to do a computer task, so she left me to do the task. Then once I was done, it said to close the browser and wait for a researcher, so I just sat there for a while until she came back in.

Interviewer: Can you tell me a bit about the task you had to do?

Target Individual: It was some sort of memory test. It was on the computer and letters would flash on the screen for a few seconds each, and I had to try to remember whether that particular letter was shown three letters ago. If it was, I had to press the “m” key, but if it wasn’t, I had to press the “n” key.

Interviewer: How long were you in the room for?

Target Individual: Umm, about 10 minutes or so.

Interviewer: Did you open the envelope?

Target Individual: No.

Interviewer: Did you take the money that was in the envelope?

Target Individual: No.

Interviewer: Did you see anyone take the money from the envelope?

Target Individual: No, there wasn’t anyone else in the room.

Interviewer: Did you see anything at all that was fishy while you were in the room?

Target Individual: No, not really.

Literal Interpretation of Figurative Language Condition

Interviewer:	I am now going to ask you some questions. Please answer all questions truthfully, to the best of your ability. In the room there was an envelope. Did you see this envelope when you were there?
Target Individual:	Yeah, I did.
Interviewer:	Where was it located?
Target Individual:	It was on the table.
Interviewer:	Do you know what was inside the envelope?
Target Individual:	I was told there was money in it.
Interviewer:	Can you describe the person who told you this?
Target Individual:	Uhm, well, she was a young lady… had long hair… was wearing glasses… and… about average height?
Interviewer:	Do you know how much money was inside the envelope?
Target Individual:	She said there was $20.
Interviewer:	Were you told that participants could take the money at any time during the study?
Target Individual:	Yes.
Interviewer:	Were you told that participants would be paid $50 if they took the money but could successfully convince the interviewer that they did not?
Target Individual:	Yes.
Interviewer:	Were you told that participants would only be paid $10 if they took the money but were judged by the interviewer as lying?
Target Individual:	Yes.
Interviewer:	Were you told that participants would be paid $20 if they chose not to take the money, irrespective of whether they were judged as lying or being truthful?
Target Individual:	Yes.
Interviewer:	Can you describe what you did after the researcher left the room?

Target Individual: I was told to do a computer task, so she left me to do the task. Then once I was done, it said to close the browser and wait for a researcher, so I just sat there for a while until she came back in.

Interviewer: Can you tell me a bit about the task you had to do?

Target Individual: It was some sort of memory test. It was on the computer and letters would flash on the screen for a few seconds each, and I had to try to remember whether that particular letter was shown three letters ago. If it was, I had to press the “m” key, but if it wasn’t, I had to press the “n” key.

Interviewer: How long were you in the room for?

Target Individual: Umm, about 10 minutes or so.

Interviewer: Did you open the envelope?

Target Individual: No.

Interviewer: Did you take the money that was in the envelope?

Target Individual: No.

Interviewer: Did you see anyone take the money from the envelope?

Target Individual: No, there wasn’t anyone else in the room.

Interviewer: Did you see anything at all that was fishy while you were in the room?

Target Individual: The computer desktop had some fish on it. It was a picture of a tropical island surrounded by a coral reef.

Poor Reciprocity Condition

Interviewer:	I am now going to ask you some questions. Please answer all questions truthfully, to the best of your ability. In the room there was an envelope. Did you see this envelope when you were there?
Target Individual:	Yeah, I did.
Interviewer:	Where was it located?
Target Individual:	It was on the table.
Interviewer:	Do you know what was inside the envelope?
Target Individual:	I was told there was money in it.
Interviewer:	Can you describe the person who told you this?
Target Individual:	Uhm, well, she was a young lady… had long hair… was wearing glasses… and… about average height?
Interviewer:	Do you know how much money was inside the envelope?
Target Individual:	She said there was $20.
Interviewer:	Were you told that participants could take the money at any time during the study?
Target Individual:	Yes.
Interviewer:	Were you told that participants would be paid $50 if they took the money but could successfully convince the interviewer that they did not?
Target Individual:	Yes.
Interviewer:	Were you told that participants would only be paid $10 if they took the money but were judged by the interviewer as lying?
Target Individual:	Yes.
Interviewer:	Were you told that participants would be paid $20 if they chose not to take the money, irrespective of whether they were judged as lying or being truthful?
Target Individual:	Yes.
Interviewer:	Can you describe what you did after the researcher left the room?

Target Individual: I was told to do a computer task, so she left me to do the task. Then once I was done, it said to close the browser and wait for a researcher, so I just sat there for a while until she came back in. When I closed the browser, I saw that the computer desktop had a picture of a tropical island with palm trees on it. There are about 2600 species of palm trees around the world. Most of them live in tropical and hot climates. Some palm trees can live up to 100 years. The tallest palm tree is the wax palm. It can grow up to 60 metres tall. It is the national tree of Columbia. Lots of things come from palm trees; you know, things like coconuts… dates… palm oil… palm syrup… oh and even acai berries. But some species of palms are endangered because of logging… human exploitation… that sort of thing. For example, there's a palm called the Tahina palm, it's in Madagascar, and it's critically endangered. There are less than 50 mature Tahina palms left in the wild. Which isn't good. So organizations like the IUCN have taken action to protect Tahina palms from exploitation and they're also trying to collect seeds to grow the species so that it doesn't go extinct...

Interviewer: Can you tell me a bit about the task you had to do?

Target Individual: It was some sort of memory test. It was on the computer and letters would flash on the screen for a few seconds each, and I had to try to remember whether that particular letter was shown three letters ago. If it was, I had to press the "m" key, but if it wasn't, I had to press the "n" key.

Interviewer: How long were you in the room for?

Target Individual: Umm, about 10 minutes or so.

Interviewer: Did you open the envelope?

Target Individual: No.

Interviewer: Did you take the money that was in the envelope?

Target Individual: No.

Interviewer: Did you see anyone take the money from the envelope?

Target Individual: No, there wasn't anyone else in the room.

Interviewer: Did you see anything at all that was fishy while you were in the room?

Target Individual: No, not really.

Appendix L

Behaviourally Anchored Rating Scales (BARS)

Please consider the following behaviours and select the option which best represents the degree to which each behaviour was displayed by the person in the interview:

The person maintained appropriate **eye contact** with the interviewer.

1	2	3	4
The person rarely made any eye contact with the interviewer and was observed to be glancing at other things in the room, e.g. hands, table, etc. Even if any eye contact was made, they were too short to be considered as appropriate.	The person exhibited little eye contact with the interviewer. Eye contact was infrequently made and intervals of eye contact were also relatively short. The person exhibited frequent shifts in eye gaze.	The person exhibited some eye contact with the interviewer. However, there were also times when their gaze shifted to other things in the room.	The person exhibited appropriate eye contact with the interviewer throughout the interview. The person exhibited appropriate shifts in eye gaze.

The person displayed **repetitive body movements.**

1	2	3	4
The person engaged in one or multiple repetitive body movements during the interview such as tapping their foot almost the whole interview and/or rubbing their temples every few seconds or so.	The person displayed some repetitive body movements either for an extended period of time (such as tapping their fingers on their lap) or at a frequent rate (such as licking their lips every minute or so).	The person engaged in minimal repetitive body movements, such as tapping their foot just a few times or running their fingers through their hair occasionally.	The person made no repetitive body movements or only made movements that appeared to serve a functional purpose or were once off, such as shifting to be more comfortable or swatting a fly.

The person showed appropriate **understanding of figurative language.**

1	2	3	4
The person demonstrated a misunderstanding of all figurative language used by the interviewer. Figurative language refers to words or phrases that are not meant to be taken literally. For example, metaphors such as “night owl” or “heart of gold”.	The person demonstrated an appropriate understanding of some of the figurative language used by the interviewer. Figurative language refers to words or phrases that are not meant to be taken literally. For example, metaphors such as “night owl” or “heart of gold”.	The person demonstrated an appropriate understanding of most of the figurative language used by the interviewer. Figurative language refers to words or phrases that are not meant to be taken literally. For example, metaphors such as “night owl” or “heart of gold”.	The person demonstrated an appropriate understanding of all figurative language used by the interviewer. Figurative language refers to words or phrases that are not meant to be taken literally. For example, metaphors such as “night owl” or “heart of gold”.

The person **talked excessively about a topic of interest.**

1	2	3	4
The person spoke for a long time about a particular topic of interest that was irrelevant to the question asked by the interviewer.	The person spoke for some time about a particular topic of interest that was irrelevant to the question asked by the interviewer.	The person spoke briefly about a particular topic of interest that was irrelevant to the question asked by the interviewer.	All information provided by the person was relevant to the question asked by the interviewer.

The person showed appropriate **emotional expression.**

1	2	3	4
The person spoke with no expression of emotion (i.e. they spoke in a monotone, they spoke slowly and softly, and did not use body language, expressive gestures, or facial expressions).	The person spoke with minimal expression of emotion (i.e. hardly varied their tone, spoke softly and slowly, and used minimal gestures and facial expressions to express themselves).	The person spoke with some expression of emotion (i.e. varied their tone, volume, and rate of speech, and used some gestures and facial expressions). However, they also displayed periods of no emotion.	The person spoke with appropriate expression of emotion (i.e. varied their tone, volume, and rate of speech where necessary, and used expressive gestures and facial expressions).

Appendix M

Assumptions Testing (Experiment 4: Preliminary Study)

Table M1

Mean Ratings of Perceived Gaze Aversion and Values of Skewness and Kurtosis

Condition of ASD Behaviour	Perceived Gaze Aversion		Skewness		Kurtosis	
	M	*SD*	Statistic	*SE*	Statistic	*SE*
Gaze Aversion	1.41	0.83	2.35	0.43	5.35	0.85
Repetitive Body Movements	3.27	0.83	-0.94	0.43	0.35	0.83
Literal Interpretation of Figurative Language	3.62	0.57	-1.19	0.46	0.59	0.89
Poor Reciprocity	3.48	0.70	-1.02	0.45	-0.14	0.87
Flat Affect	3.66	0.83	-2.54	0.41	5.71	0.81
Control Condition	3.50	0.65	-0.96	0.46	-0.04	0.89

Table M2

Mean Ratings of Perceived Repetitive Body Movements and Values of Skewness and Kurtosis

Condition of ASD Behaviour	Perceived Body Movements		Skewness		Kurtosis	
	M	*SD*	Statistic	*SE*	Statistic	*SE*
Gaze Aversion	2.76	1.06	-0.26	0.43	-1.15	0.85
Repetitive Body Movements	1.27	0.52	1.87	0.43	2.93	0.83
Literal Interpretation of Figurative Language	3.31	0.79	0.63	0.46	-1.07	0.89
Poor Reciprocity	2.81	0.83	-0.06	0.45	-0.71	0.87
Flat Affect	3.72	0.58	-2.01	0.41	3.19	0.81
Control Condition	2.73	0.96	0.01	0.46	-1.08	0.89

Table M3

Mean Ratings of Perceived Literal Interpretation of Figurative Language and Values of Skewness and Kurtosis

Condition of ASD Behaviour	Perceived Literal Interpretation		Skewness		Kurtosis	
	M	*SD*	Statistic	*SE*	Statistic	*SE*
Gaze Aversion	3.24	0.91	-1.13	0.43	0.63	0.85
Repetitive Body Movements	3.60	0.77	-1.57	0.43	0.72	0.83
Literal Interpretation of Figurative Language	2.96	1.08	-0.75	0.46	-0.61	0.89
Poor Reciprocity	3.07	0.96	-0.44	0.45	-1.19	0.87
Flat Affect	3.81	0.54	-2.87	0.41	7.43	0.81
Control Condition	3.54	0.81	-1.35	0.46	0.01	0.89

Table M4

Mean Ratings of Perceived Poor Reciprocity and Values of Skewness and Kurtosis

Condition of ASD Behaviour	Perceived Poor Reciprocity		Skewness		Kurtosis	
	M	*SD*	Statistic	*SE*	Statistic	*SE*
Gaze Aversion	3.72	0.59	-2.09	0.43	3.49	0.85
Repetitive Body Movements	3.87	0.43	-3.50	0.43	12.51	0.83
Literal Interpretation of Figurative Language	3.62	0.70	-1.60	0.46	1.21	0.89
Poor Reciprocity	1.85	1.06	1.15	0.45	0.17	0.87
Flat Affect	4.00	0.00	-	-	-	-
Control Condition	3.65	0.89	-2.52	0.46	5.22	0.89

Table M5

Mean Ratings of Perceived Flat Affect and Values of Skewness and Kurtosis

Condition of ASD Behaviour	Perceived Flat Affect		Skewness		Kurtosis	
	M	*SD*	Statistic	*SE*	Statistic	*SE*
Gaze Aversion	2.31	0.71	1.37	0.43	1.55	0.85
Repetitive Body Movements	2.83	0.70	0.24	0.43	-0.83	0.83
Literal Interpretation of Figurative Language	2.85	1.01	-0.18	0.46	-1.24	0.89
Poor Reciprocity	3.26	0.81	-0.99	0.45	0.75	0.87
Flat Affect	1.84	0.99	0.98	0.41	-0.03	0.81
Control Condition	3.31	0.68	-0.47	0.46	-0.67	0.89

Appendix N

Assumptions Testing (Experiment 4)

Table N1

Mean Ratings of Perceived Gaze Aversion and Values of Skewness and Kurtosis

Condition of ASD Behaviour	Perceived Gaze Aversion		Skewness		Kurtosis	
	M	*SD*	Statistic	*SE*	Statistic	*SE*
Gaze Aversion	1.29	0.56	1.78	0.27	2.27	0.54
Repetitive Body Movements	3.16	0.86	-0.57	0.27	-0.77	0.54
Poor Reciprocity	3.04	0.76	-0.58	0.27	0.28	0.53
Flat Affect	3.63	0.56	-1.24	0.28	0.60	0.55
Control Condition	3.35	0.70	-0.60	0.27	-0.77	0.54

Table N2

Mean Ratings of Perceived Repetitive Body Movements and Values of Skewness and Kurtosis

Condition of ASD Behaviour	Perceived Body Movements		Skewness		Kurtosis	
	M	*SD*	Statistic	*SE*	Statistic	*SE*
Gaze Aversion	2.50	0.99	0.17	0.27	-1.01	0.54
Repetitive Body Movements	1.12	0.37	3.20	0.27	10.50	0.55
Poor Reciprocity	2.62	0.91	0.03	0.27	-0.84	0.53
Flat Affect	3.35	0.96	-1.13	0.27	-0.10	0.54
Control Condition	2.60	0.94	0.03	0.27	-0.92	0.54

Table N3

Mean Ratings of Perceived Poor Reciprocity and Values of Skewness and Kurtosis

Condition of ASD Behaviour	Perceived Poor Reciprocity		Skewness		Kurtosis	
	M	*SD*	Statistic	*SE*	Statistic	*SE*
Gaze Aversion	3.55	0.82	-1.79	0.27	2.29	0.54
Repetitive Body Movements	3.75	0.57	-2.18	0.27	3.68	0.55
Poor Reciprocity	1.41	0.86	2.06	0.27	3.16	0.53
Flat Affect	3.91	0.29	-2.85	0.28	6.31	0.55
Control Condition	3.71	0.54	-1.66	0.27	1.94	0.54

Table N4

Mean Ratings of Perceived Flat Affect and Values of Skewness and Kurtosis

Condition of ASD Behaviour	Perceived Flat Affect		Skewness		Kurtosis	
	M	*SD*	Statistic	*SE*	Statistic	*SE*
Gaze Aversion	2.26	0.83	0.33	0.27	-0.31	0.54
Repetitive Body Movements	2.77	0.81	0.15	0.27	-0.90	0.54
Poor Reciprocity	2.89	0.80	-0.24	0.27	-0.51	0.53
Flat Affect	1.62	0.83	1.38	0.27	1.50	0.54
Control Condition	2.91	0.78	0.16	0.27	-1.31	0.54

Table N5

Mean Ratings of Perceived Deception and Values of Skewness and Kurtosis

Condition of ASD Behaviour	Perceived Deception		Skewness		Kurtosis	
	M	*SD*	Statistic	*SE*	Statistic	*SE*
Gaze Aversion	4.84	3.23	1.24	0.38	0.29	0.75
Repetitive Body Movements	3.77	2.81	2.07	0.38	3.54	0.74
Poor Reciprocity	4.21	3.02	1.41	0.38	0.82	0.74
Flat Affect	6.00	3.61	0.63	0.37	-1.15	0.72
Control Condition	6.02	3.80	0.48	0.37	-1.38	0.73

Table N6

Mean Ratings of Perceived Deception and Values of Skewness and Kurtosis after Logarithmic Transformation

Condition of ASD Behaviour	Perceived Deception		Skewness		Kurtosis	
	M	*SD*	Statistic	*SE*	Statistic	*SE*
Gaze Aversion	0.60	0.26	0.48	0.38	-0.81	0.75
Repetitive Body Movements	0.50	0.24	1.15	0.38	0.49	0.74
Poor Reciprocity	0.54	0.26	0.79	0.38	-0.71	0.74
Flat Affect	0.70	0.27	0.04	0.37	-1.22	0.72
Control Condition	0.69	0.30	-0.01	0.37	-1.51	0.73

Table N7

Mean Ratings of Perceived Competence and Values of Skewness and Kurtosis

Condition of ASD Behaviour	Perceived Competence		Skewness		Kurtosis	
	M	*SD*	Statistic	*SE*	Statistic	*SE*
Gaze Aversion	23.95	4.35	0.65	0.37	0.06	0.73
Repetitive Body Movements	24.50	4.37	0.13	0.38	-0.51	0.75
Poor Reciprocity	26.07	4.53	-0.60	0.36	0.34	0.71
Flat Affect	24.42	4.92	-0.41	0.39	-0.02	0.77
Control Condition	25.11	4.15	0.26	0.39	-0.07	0.76

Table N8

Mean Ratings of Perceived Caring and Values of Skewness and Kurtosis

Condition of ASD Behaviour	Perceived Caring		Skewness		Kurtosis	
	M	*SD*	Statistic	*SE*	Statistic	*SE*
Gaze Aversion	11.97	3.03	-0.18	0.37	-0.56	0.73
Repetitive Body Movements	11.55	3.13	0.68	0.38	1.93	0.75
Poor Reciprocity	10.33	3.21	-0.55	0.36	-0.17	0.71
Flat Affect	10.28	3.50	-0.11	0.39	-0.67	0.77
Control Condition	12.57	3.37	0.55	0.39	0.66	0.76

Table N9

Mean Ratings of Perceived Character and Values of Skewness and Kurtosis

Condition of ASD Behaviour	Perceived Character		Skewness		Kurtosis	
	M	*SD*	Statistic	*SE*	Statistic	*SE*
Gaze Aversion	24.48	7.09	0.48	0.37	-0.69	0.73
Repetitive Body Movements	25.68	7.00	0.51	0.38	-0.46	0.75
Poor Reciprocity	23.86	7.51	0.06	0.36	-0.29	0.71
Flat Affect	25.25	8.31	0.14	0.39	-0.36	0.77
Control Condition	26.57	7.75	0.12	0.39	0.20	0.76

Table N10

Mean Ratings of Perceived Deception (with Knowledge of ASD) and Values of Skewness and Kurtosis

Condition of ASD Behaviour	Perceived Deception		Skewness		Kurtosis	
	M	*SD*	Statistic	*SE*	Statistic	*SE*
Gaze Aversion	7.21	3.35	-0.03	0.38	-1.17	0.75
Repetitive Body Movements	7.08	3.27	-0.08	0.38	-1.11	0.74
Poor Reciprocity	6.63	3.49	-0.01	0.38	-1.29	0.74
Flat Affect	8.17	3.37	-0.49	0.37	-0.98	0.72
Control Condition	7.55	3.50	-0.16	0.37	-1.26	0.73

Table N11

Mean Ratings of Perceived Competence (with Knowledge of ASD) and Values of Skewness and Kurtosis

Condition of ASD Behaviour	Perceived Competence		Skewness		Kurtosis	
	M	*SD*	Statistic	*SE*	Statistic	*SE*
Gaze Aversion	24.47	4.18	0.09	0.37	1.17	0.73
Repetitive Body Movements	25.08	4.25	0.38	0.38	-0.70	0.75
Poor Reciprocity	25.40	3.99	0.31	0.36	-0.78	0.71
Flat Affect	24.39	4.19	0.54	0.39	-0.16	0.77
Control Condition	24.62	4.66	0.27	0.39	-0.38	0.76

Table N12

Mean Ratings of Perceived Caring (with Knowledge of ASD) and Values of Skewness and Kurtosis

Condition of ASD Behaviour	Perceived Caring		Skewness		Kurtosis	
	M	*SD*	Statistic	*SE*	Statistic	*SE*
Gaze Aversion	13.42	3.41	0.06	0.37	0.88	0.73
Repetitive Body Movements	12.32	3.67	0.25	0.38	0.72	0.75
Poor Reciprocity	11.49	3.27	-0.14	0.36	0.31	0.71
Flat Affect	11.08	3.95	-0.13	0.39	-0.04	0.77
Control Condition	13.16	3.46	0.35	0.39	-0.08	0.76

Table N13

Mean Ratings of Perceived Character (with Knowledge of ASD) and Values of Skewness and Kurtosis

Condition of ASD Behaviour	Perceived Character		Skewness		Kurtosis	
	M	*SD*	Statistic	*SE*	Statistic	*SE*
Gaze Aversion	28.65	5.41	0.37	0.37	-0.14	0.73
Repetitive Body Movements	30.16	6.50	0.54	0.38	-0.66	0.75
Poor Reciprocity	28.35	5.57	0.11	0.36	0.19	0.71
Flat Affect	27.86	6.76	-0.15	0.39	0.75	0.77
Control Condition	30.31	5.87	0.21	0.39	-0.83	0.76

Appendix O

Reliability Analyses for the Coding of Participant-Reported Cues Indicative of Deception and Non-Credibility (Experiment 4)

Table O1

Inter-Rater Reliability for the Coding of Participant-Reported Cues Indicative of Deception and Non-Credibility

Measure	Condition of ASD Behaviour	*n*	Reliability Statistic	
			Cohen's kappa (κ)	Gwet's AC1
Deception	Repetitive Body Movements	39	.69	.87
	Poor Reciprocity	39	.87	.92
Credibility	Poor Reciprocity	43	.72	.79
	Flat Affect	36	.88	.92

Appendix P

Demographics of the Target Individuals (Experiment 5)

Table P1

Demographics of the Neurotypical and ASD Target Individuals

Neurotypical Individuals				ASD Individuals			
No.	Gender	Age	Ethnicity	No.	Gender	Age	Ethnicity
1	Female	20	Asian	30	Female	24	Caucasian
2	Female	20	Asian	31	Male	55	Caucasian
3	Female	20	Asian	32	Male	24	Caucasian
4	Male	20	Asian	33	Male	27	Caucasian
5	Female	24	Asian	34	Female	28	Caucasian
6	Female	18	Caucasian	35	Male	29	Caucasian
7	Male	27	Caucasian	36	Male	65	Caucasian
8	Male	23	Caucasian	37	Female	37	Caucasian
9	Female	20	Asian	38	Male	46	Caucasian
10	Female	21	Caucasian	39	Male	23	Caucasian
11	Male	31	Caucasian	40	Male	33	Caucasian
12	Female	22	Asian	41	Male	66	Caucasian
13	Male	23	Caucasian	42	Male	36	Caucasian
14	Male	21	Asian	43	Female	24	Caucasian
15	Female	20	Caucasian	44	Male	23	Caucasian
16	Male	28	Asian	45	Male	21	Caucasian
17	Female	21	Caucasian	46	Male	31	Caucasian
18	Female	28	Caucasian	47	Male	27	Caucasian
19	Female	38	Caucasian	48	Male	25	Caucasian
20	Male	38	Caucasian	49*	Male	38	Caucasian
21	Male	32	Caucasian	50	Male	26	Caucasian
22	Male	25	Caucasian	51	Male	42	Caucasian
23	Female	23	Caucasian	52	Female	62	Caucasian
24	Male	22	Asian	53	Male	22	Caucasian
25	Male	24	Caucasian	54	Male	26	Caucasian
26	Male	24	Caucasian	55	Female	19	Caucasian
27	Female	21	Caucasian	56	Male	36	Caucasian
28	Male	36	Caucasian	57	Male	30	Caucasian
29	Female	25	Caucasian	58	Female	18	Caucasian
				59	Female	48	Caucasian
				60	Female	51	Caucasian

*The video from this individual was excluded from the study as the truthfulness of his responses could not be ascertained.

Appendix Q

Behavioural Analysis Coding Sheets (Experiment 5)

Direct Gaze

Video Recording: _____

Name of Coder: _____

Instructions:

Duration recording of direct gaze requires focusing on the amount of time the individual spent engaged in the behaviour. This behaviour is operationalised as the individual maintaining their gaze at the face of the interviewer, with no shifts in gaze.

Observe and record the start and end of each interval the individual maintained direct gaze at the interviewer. Any shifts in gaze will signal the end of this behaviour. Each video will display a timestamp. Record the timestamp at the start and end of each instance the behaviour was displayed in the table provided on the next page. After coding the behaviour, calculate the duration (in seconds) of each interval that the behaviour was exhibited.

Record the total duration of the interview (in seconds).

Behaviour: Direct Gaze

Definition of Behaviour: The individual gazed at the face of the interviewer, without displaying any shifts of gaze.

Time at Start of Behaviour	Time at End of Behaviour	Duration of Behaviour (s)

A. Total Duration of Behaviour (s)	
B. Total Duration of Interview (s)	
C. Total Duration of Non-Behaviour (s) [B - A]	
D. Percentage of Time Gaze Maintained (%) [A / B × 100]	
E. Percentage of Time Gaze Averted (%) [C / B × 100]	

Repetitive Body Movements

Video Recording: _____

Name of Coder: _____

Instructions:

Partial interval recording of repetitive body movements requires focusing on whether the behaviour did or did not occur during a specified time period. This behaviour is operationalised as the individual's engagement in any body movement or use of object that (1) was not required to meet the demands of the interview or did not appear to serve a functional purpose, and (2) was displayed more than once within the duration of the interview. Examples include running their hand through their hair multiple times, tapping their foot repeatedly, twirling a pen repeatedly, or touching their face multiple times. Non-examples include swatting a fly, sneezing, shifting once to be more comfortable, or gesturing to illustrate a point to the interviewer.

The interview has been broken down into 5-second intervals. If the target individual engaged in a repetitive behaviour at any time during that 5-second period, rate the intensity of the behaviour on the following scale:

1 = Subtle

2 = Moderate

3 = Intense/ Distracting

<u>If you are unable to decide between two ratings, make the lower (i.e., more socially appropriate) rating.</u>

Each interval should have a maximum of only one rating, regardless of how many times the behaviour occurred within that 5-second period. If the behaviour occurred at different intensities within the same 5-second interval, enter the highest rating for that interval.

Observe and record the repetitive body movements displayed by the individual in all subsequent 5-second intervals in the same way.

Circle interval number of the last interval of the interview and record that number as the "Total Number of Intervals" (include partial intervals, e.g., if the duration of the video was 02:07, consider 02:06 – 02:10 as the last interval and record '26' as the number of intervals).

Behaviour: Repetitive Body Movements

Definition of Behaviour: The individual engaged in any body movement or use of object that (1) was not required to meet the demands of the interview or did not appear to serve a functional purpose, and (2) was displayed more than once within the duration of the interview.

- ***Examples:*** Running their hand through their hair multiple times, tapping their foot repeatedly, twirling a pen repeatedly, scratching/ touching their face multiple times
- ***Non-examples:*** Swatting a fly, sneezing, shifting once to be more comfortable, scratching their face once, gesturing to illustrate a point to the interviewer

Interval		**Repetitive Body Movements**	**Interval**		**Repetitive Body Movements**
1.	0:00 - 0:05		16.	1:16 - 1:20	
2.	0:06 - 0:10		17.	1:21 - 1:25	
3.	0:11 - 0:15		18.	1:26 - 1:30	
4.	0:16 - 0:20		19.	1:31 - 1:35	
5.	0:21 - 0:25		20.	1:36 - 1:40	
6.	0:26 - 0:30		21.	1:41 - 1:45	
7.	0:31 - 0:35		22.	1:46 - 1:50	
8.	0:36 - 0:40		23.	1:51 - 1:55	
9.	0:41 - 0:45		24.	1:56 - 2:00	
10.	0:46 - 0:50		25.	2:01 - 2:05	
11.	0:51 - 0:55		26.	2:06 - 2:10	
12.	0:56 - 1:00		27.	2:11 - 2:15	
13.	1:01 - 1:05		28.	2:16 - 2:20	
14.	1:06 - 1:10		29.	2:21 - 2:25	
15.	1:11 - 1:15		30.	2:26 - 2:30	
A. Number of Intervals with Repetitive Body Movements					
B. Total Intensity Score					
C. Total Number of Intervals					
D. Percentage of Intervals with Repetitive Body Movements					
E. Percentage Intensity Score [B / (C × 3) × 100]					

Literal Interpretation of Figurative Language

Video Recording: _____

Name of Coder: _____

Behaviour: Literal Interpretation of Figurative Language

Definition of Behaviour: The individual has difficulty understanding the figurative meaning of the phrase "fishy" that was intended by the interviewer in the question, “Did you see anything at all that was fishy while you were in the room?” The figurative meaning of the phrase “fishy” is “creating doubt or suspicion.”

Literal interpretation of figurative language was:

- ☐ Present
- ☐ Absent

Poor Reciprocity

Video Recording: _____

Name of Coder: _____

Instructions:

Duration recording of the maintenance of poor reciprocity requires focusing on the amount of time the individual spent engaged in the behaviour. This behaviour is operationally defined as providing a response that either (1) is irrelevant to the question asked by the interviewer, or (2) does not fully answer the question asked by the interviewer. Irrelevant responses that are due to difficulty understanding figurative language should not be coded under poor reciprocity.

Observe and record the start and end of each interval the individual engaged in poor reciprocity. The behaviour ends when either of the following occur: (1) the individual shifts to providing information that is relevant to the question asked by the interviewer, or (2) the individual stops talking to allow the interviewer to speak. Each video will display a timestamp. Record the timestamp at the start and end of each instance the behaviour was displayed in the table provided on the next page. After coding the behaviour, calculate the duration (in seconds) of each interval that the behaviour was exhibited.

Record the total duration of the interview (in seconds).

Behaviour: Poor Reciprocity

Definition of Behaviour: The individual provided a response that either (1) was irrelevant to the question asked by the interviewer, or (2) did not fully answer the question asked by the interviewer.

Time at Start of Behaviour	Time at End of Behaviour	Duration of Behaviour (s)

A. Total Duration of Behaviour (s)	
B. Total Duration of Interview (s)	
C. Percentage of Time Behaviour is Present (%) [A / B × 100]	

Emotional Expression

Video Recording: _____

Name of Coder: _____

Behaviour: Emotional Expression

Definition of Behaviour: The individual spoke with appropriate expression of emotion (i.e. varied their tone, volume, and rate of speech where necessary, and used expressive gestures and facial expressions) throughout the interview.

Please circle the option that best describes how the individual behaved during the interview. Be sure to consider the individual's behaviour across the entire interview.

If you are unable to decide between two ratings, make the higher (i.e., more socially appropriate) rating.

1	2	3
The individual spoke with no expression of emotion (i.e. they spoke in a monotone, they spoke slowly and softly, and did not use body language, expressive gestures, or facial expressions).	The individual spoke with minimal expression of emotion (i.e. hardly varied their tone, spoke softly and slowly, and used minimal gestures and facial expressions to express themselves).	The individual spoke with appropriate expression of emotion (i.e. varied their tone, volume, and rate of speech where necessary, and used expressive gestures and facial expressions).

Appendix R

Clinical Impression Rating Sheet (Experiment 5)

Video Recording: _____

Name of Rater: _____

Please indicate your assessment of how likely it is that the individual's behaviours are consistent with each of the following diagnoses (listed in alphabetical order). For each rating, please also indicate how confident you are in your decision, from 0% (*not at all confident*) to 100% (*highly confident*).

	Likelihood of Diagnosis							**Confidence**
	Extremely Unlikely						*Extremely Likely*	*Enter value from 0-100%*
Anxiety Disorder	1	2	3	4	5	6	7	
Autism Spectrum Disorder	1	2	3	4	5	6	7	
Bipolar Disorder	1	2	3	4	5	6	7	
Intellectual Disability	1	2	3	4	5	6	7	
Language Disorder	1	2	3	4	5	6	7	
Mood Disorder	1	2	3	4	5	6	7	
Obsessive-Compulsive Disorder	1	2	3	4	5	6	7	
Personality Disorder	1	2	3	4	5	6	7	
Post-Traumatic Stress Disorder	1	2	3	4	5	6	7	
Schizophrenia	1	2	3	4	5	6	7	
No Diagnosis	1	2	3	4	5	6	7	

☐ I am unable to provide a rating because I recognise the person in the video.

Appendix S

Individual Multilevel Mediation Models (Experiment 5)

Table R1

Individual Multilevel Mediation Models between ASD Diagnosis, ASD Behaviour, and Perceived Deception and Credibility

	Perceived Deception		Perceived Competence		Perceived Caring		Perceived Character	
	Estimate	95% CI	Estimate	95% CI	Estimate	95% CI	Estimate	95% CI
Gaze Aversion								
Total Effect (*c*)	**0.86****	**0.39, 1.32**	**-2.48*****	**-3.52, -1.43**	-0.58	-1.18, 0.01	**-1.88***	**-3.31, -0.45**
Direct Effects								
Mediator on ASD Diagnosis (*a*)	6.07	0.77, 11.37	6.07	0.77, 11.37	6.07	0.77, 11.37	6.07	0.77, 11.37
Outcome on Mediator (*b*)	-0.01	-0.03, 0.01	-0.03	-0.07, 0.02	-0.01	-0.03, 0.01	-0.04	-0.10, 0.02
Outcome on ASD Diagnosis (*c'*)	**0.93****	**0.43, 1.42**	**-2.31*****	**-3.38, -1.24**	-0.51	-1.09, 0.07	-1.63	-3.06, -0.20
Indirect Effect (*ab*)	-0.07	-0.19, 0.05	-0.17	-0.48, 0.15	-0.07	-0.21, 0.07	-0.25	-0.64, 0.15
Repetitive Body Movements								
Total Effect (*c*)	**0.85****	**0.39, 1.32**	**-2.48*****	**-3.52, -1.43**	-0.58	-1.17, 0.01	**-1.88***	**-3.31, -0.45**
Direct Effects								
Mediator on ASD Diagnosis (*a*)	1.92	-3.06, 6.90	1.92	-3.06, 6.90	1.92	-3.06, 6.90	1.92	-3.06, 6.90
Outcome on Mediator (*b*)	-0.02	-0.04, 0.00	-0.02	-0.06, 0.01	0.03	0.00, 0.05	0.001	-0.06, 0.06
Outcome on ASD Diagnosis (*c'*)	**0.89*****	**0.44, 1.34**	**-2.43*****	**-3.49, -1.38**	-0.63	-1.21, -0.04	**-1.88***	**-3.28, -0.48**
Indirect Effect (*ab*)	-0.04	-0.13, 0.06	-0.05	-0.19, 0.10	0.05	-0.10, 0.19	0.001	-0.11, 0.11
Literal Interpretation of Figurative Language								
Total Effect (*c*)	**0.85****	**0.39, 1.32**	**-2.47*****	**-3.52, -1.43**	-0.58	-1.18, 0.01	**-1.88***	**-3.31, -0.45**
Direct Effects								
Mediator on ASD Diagnosis (*a*)	0.13	0.01, 0.26	0.13	0.01, 0.26	0.13	0.01, 0.26	0.13	0.01, 0.26
Outcome on Mediator (*b*)	-0.33	-1.00, 0.34	0.99	-0.43, 2.41	**0.96***	**0.25, 1.68**	2.08	-0.001, 4.16
Outcome on ASD Diagnosis (*c'*)	**0.90****	**0.42, 1.37**	**-2.60*****	**-3.73, -1.48**	-0.71	-1.33, -0.09	**-2.15***	**-3.69, -0.62**
Indirect Effect (*ab*)	-0.04	-0.14, 0.05	0.13	-0.12, 0.38	0.13	-0.06, 0.31	0.28	-0.19, 0.74

Poor Reciprocity								
Total Effect (*c*)	**0.86****	**0.40, 1.33**	**-2.48*****	**-3.52, -1.43**	-0.59	-1.18, 0.01	**-1.89***	**-3.31, -0.46**
Direct Effects								
Mediator on ASD Diagnosis (*a*)	1.00	-0.18, 2.17	1.00	-0.18, 2.17	1.00	-0.18, 2.17	1.00	-0.18, 2.17
Outcome on Mediator (*b*)	**-0.07***	**-0.13, -0.02**	-0.12	-0.33, 0.09	-0.08	-0.16, -0.01	-0.22	-0.44, 0.01
Outcome on ASD Diagnosis (*c'*)	**0.94****	**0.45, 1.42**	**-2.36*****	**-3.43, -1.29**	-0.50	-1.09, 0.08	-1.67	-3.15, -0.19
Indirect Effect (*ab*)	-0.07	-0.16, 0.02	-0.12	-0.39, 0.15	-0.08	-0.22, 0.05	-0.22	-0.58, 0.15
Flat Affect								
Total Effect (*c*)	**0.86****	**0.39, 1.33**	**-2.47*****	**-3.52, -1.42**	-0.58	-1.17, 0.02	**-1.87***	**-3.29, -0.44**
Direct Effects								
Mediator on ASD Diagnosis (*a*)	0.06	-0.08, 0.21	0.06	-0.08, 0.21	0.06	-0.08, 0.21	0.06	-0.08, 0.21
Outcome on Mediator (*b*)	0.14	-0.79, 1.06	-1.14	-2.58, 0.30	**-1.19****	**-1.91, -0.46**	-2.20	-4.74, 0.35
Outcome on ASD Diagnosis (*c'*)	**0.85****	**0.37, 1.33**	**-2.40*****	**-3.46, -1.33**	-0.50	-1.07, 0.07	**-1.73***	**-3.16, -0.30**
Indirect Effect (*ab*)	0.01	-0.06, 0.08	-0.07	-0.30, 0.15	-0.08	-0.26, 0.11	-0.14	-0.56, 0.28
Clinical Impression of ASD								
Total Effect (*c*)	**0.86****	**0.39, 1.33**	**-2.48*****	**-3.53, -1.43**	-0.59	-1.18, 0.01	**-1.89***	**-3.32, -0.47**
Direct Effects								
Mediator on ASD Diagnosis (*a*)	**0.89*****	**0.57, 1.21**	**0.89*****	**0.57, 1.21**	**0.89*****	**0.57, 1.21**	**0.89*****	**0.57, 1.21**
Outcome on Mediator (*b*)	-0.01	-0.32, 0.30	**-0.90***	**-1.58, -0.21**	-0.37	-0.75, 0.002	**-1.41***	**-2.41, -0.41**
Outcome on ASD Diagnosis (*c'*)	**0.87***	**0.30, 1.44**	**-1.68***	**-2.84, -0.52**	-0.25	-0.89, 0.38	-0.63	-2.42, 1.16
Indirect Effect (*ab*)	-0.01	-0.29, 0.27	-0.80	-1.49, -0.11	-0.33	-0.69, 0.02	**-1.26***	**-2.28, -0.24**
Clinical Impression of Any Disorder								
Total Effect (*c*)	**0.87****	**0.40, 1.34**	**-2.49*****	**-3.53, -1.44**	-0.59	-1.18, 0.003	**-1.90***	**-3.32, -0.48**
Direct Effects								
Mediator on ASD Diagnosis (*a*)	**1.29*****	**0.94, 1.63**	**1.29*****	**0.94, 1.63**	**1.29*****	**0.94, 1.63**	**1.29*****	**0.94, 1.63**
Outcome on Mediator (*b*)	0.17	-0.12, 0.46	**-1.36****	**-2.07, -0.65**	**-0.58****	**-0.88, -0.27**	**-1.92*****	**-2.68, -1.16**
Outcome on ASD Diagnosis (*c'*)	0.65	0.08, 1.21	-0.74	-2.02, 0.55	0.15	-0.52, 0.82	0.57	-1.11, 2.24
Indirect Effect (*ab*)	0.22	-0.16, 0.60	**-1.75***	**-2.89, -0.61**	**-0.74****	**-1.18, -0.30**	**-2.47*****	**-3.62, -1.31**

Note. Estimates that are significant at the .05 level are indicated in bold.
$^{*}p \leq .05$, $^{**}p \leq .01$, $^{***}p \leq .001$

Appendix T

Multilevel Mediation Models with Flat Affect as a Mediator (Experiment 5)

Table S1

Multilevel Mediation Models between ASD Diagnosis, ASD Behaviours, and Perceived Deception and Credibility (with Flat Affect)

	Perceived Deception		Perceived Competence		Perceived Caring		Perceived Character	
	Estimate	95% CI	Estimate	95% CI	Estimate	95% CI	Estimate	95% CI
Total Effects								
ASD Diagnosis (*c*)	**0.87****	**0.40, 1.34**	**-2.49*****	**-3.54, -1.44**	-0.58	-1.17, 0.01	**-1.91***	**-3.33, -0.49**
Direct Effects								
ASD Diagnosis (*c'*)	0.64	0.10, 1.18	-0.77	-2.13, 0.59	-0.05	-0.79, 0.69	0.33	-1.48, 2.14
Mediators on ASD Diagnosis:								
Gaze Aversion (a_1)	6.07	0.77, 11.37	6.07	0.77, 11.37	6.07	0.77, 11.37	6.07	0.77, 11.37
Repetitive Body Movements (a_2)	1.92	-3.06, 6.90	1.92	-3.06, 6.90	1.92	-3.06, 6.90	1.92	-3.06, 6.90
Literal Interpretation (a_3)	0.13	0.01, 0.26	0.13	0.01, 0.26	0.13	0.01, 0.26	0.13	0.01, 0.26
Poor Reciprocity (a_4)	1.00	-0.18, 2.17	1.00	-0.18, 2.17	1.00	-0.18, 2.17	1.00	-0.18, 2.17
Flat Affect (a_5)	0.06	-0.08, 0.21	0.06	-0.08, 0.21	0.06	-0.08, 0.21	0.06	-0.08, 0.21
Clinical Impression (a_6)	**1.29*****	**0.94, 1.63**	**1.29*****	**0.94, 1.63**	**1.29*****	**0.94, 1.63**	**1.29*****	**0.94, 1.63**
Outcome on Mediators:								
Gaze Aversion (b_1)	-0.01	-0.03, 0.01	-0.002	-0.04, 0.04	-0.01	-0.03, 0.01	-0.01	-0.04, 0.04
Repetitive Body Movements (b_2)	**-0.03***	**-0.05, -0.01**	-0.03	-0.07, 0.01	0.02	-0.01, 0.04	-0.01	-0.07, 0.04
Literal Interpretation (b_3)	-0.12	-0.64, 0.40	0.99	-0.68, 2.66	0.63	-0.13, 1.40	1.80	-0.22, 3.82
Poor Reciprocity (b_4)	**-0.11****	**-0.17, -0.04**	-0.07	-0.25, 0.10	-0.03	-0.09, 0.04	-0.12	-0.26, 0.03
Flat Affect (b_5)	-0.46	-1.56, 0.65	0.34	-1.32, 2.00	-0.43	-1.29, 0.43	0.10	-2.60, 2.79
Clinical Impression (b_6)	0.37	0.05, 0.68	**-1.34***	**-2.31, -0.38**	-0.42	-0.82, -0.02	**-1.77*****	**-2.67, -0.86**
Indirect Effects								
Total Indirect Effect (*ab*)	0.23	-0.19, 0.65	**-1.72***	**-3.01, -0.43**	-0.53	-1.07, 0.01	**-2.24****	**-3.49, -0.98**
Gaze Aversion (a_1b_1)	-0.04	-0.18, 0.09	-0.02	-0.27, 0.24	-0.06	-0.20, 0.08	-0.07	-0.38, 0.24
Repetitive Body Movements (a_2b_2)	-0.05	-0.19, 0.09	-0.06	-0.23, 0.11	0.04	-0.08, 0.15	-0.02	-0.14, 0.10
Literal Interpretation (a_3b_3)	-0.02	-0.08, 0.05	0.13	-0.14, 0.40	0.08	-0.06, 0.23	0.24	-0.18, 0.66
Poor Reciprocity (a_4b_4)	-0.11	-0.23, 0.02	-0.07	-0.26, 0.12	-0.03	-0.09, 0.04	-0.12	-0.30, 0.07
Flat Affect (a_5b_5)	-0.03	-0.09, 0.03	0.02	-0.08, 0.12	-0.03	-0.12, 0.06	0.01	-0.16, 0.17
Clinical Impression (a_6b_6)	0.47	0.05, 0.89	**-1.73***	**-3.14, -0.31**	-0.54	-1.07, -0.01	**-2.27****	**-3.47, -1.08**

Note. Estimates that are significant at the .05 level are indicated in bold.
*$p \leq .05$, **$p \leq .01$, ***$p \leq .001$

Appendix U

Reliability Analyses for the Coding of Participant-Reported Cues Indicative of Deception and Non-Credibility (Experiment 5)

Table T1

Inter-Rater Reliability for the Coding of Participant-Reported Cues Indicative of Deception and Non-Credibility

Behavioural Cue	Deception (*n* =143)		Credibility (*n* = 139)	
	Cohen's kappa (κ)	Gwet's AC1	Cohen's kappa (κ)	Gwet's AC1
Gaze Aversion	.89	.96	.97	.99
Repetitive Body Movements	.86	.97	.90	.98
Literal Interpretation of Figurative Language	1	1	-	1
Poor Reciprocity	.38	.96	.53	.96
Flat Affect	.66	.99	.39	.98
Hesitation	.70	.94	.50	.99
Smiling/ Smirking/ Laughing	.96	.99	.92	.99
Inconsistent Demeanour	.94	.99	.88	.99
Unsure	.94	.99	.97	.99