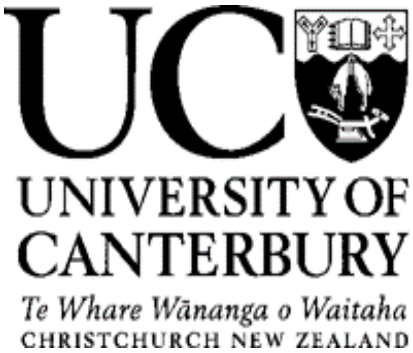
Improving the Social Communication Skills of Children with Autism Through Video Self-Modelling: An Early Efficacy Study Using Single Subject Design

A thesis submitted in partial fulfilment of
the requirements for the Degree of
Master of Science in Speech and Language Sciences



School of Psychology, Speech and Hearing
University of Canterbury
2019

by
Ingrid Anne Y. Chi

“Hapaitia te ara tika pumau ai te rangatiratanga mo nga uri whakatipu”.

Foster the pathway of knowledge to strength, independence and growth for future generations.

Acknowledgements

There are no words to express my gratitude for all the support I received throughout this journey. To Dr. Jayne Newbury, I am grateful for your patience, guidance, encouragement and selfless generosity. You have been instrumental in motivating me to continue this thesis through to completion. To Dr. Dean Sutherland, for your support and feedback, especially towards the beginning and conclusion of my thesis. I thank you both for sharing your knowledge and expertise. It was an honour to have had the opportunity to learn from both of you. I also acknowledge the support of university and department staff who were always helpful with my queries. Thank you for kindly considering my study circumstances.

The three children and their families to whom I am deeply indebted, thank you for opening your homes and hearts to me. To Reva and Tasha, I sincerely thank you for taking the time from your busy schedules to watch and score my study videos at short notice. Your contributions have been vital to this manuscript. To the senior staff at the organisation I work for, I am truly grateful for your accommodation and unrelenting support.

To Jenny, thank you for believing in me when I doubted myself and for the constant encouragement that came in many ways. I am privileged to have known you. To my friends and colleagues then and now, and everyone in between, thank you for your acceptance and understanding when I was unavailable, for filling my soul and my appetite, for enriching my life, and for just being there, even when I was not. To all the families and individuals whom I have had the privilege of working with all these years, you are the purpose of my commitment to this vocation.

To my family, for consistently believing in me, especially to my mother, whose strength and gentleness continue to guide me in my life pursuits. To my brother Aaron, you have been a lifesaver. Thank you for listening and putting up with my chaos. Your organisational skills, advices, non-judgement, and calm disposition made everything easier to bear throughout this process. To my husband, Alrex, it has been a roller coaster ride, but I am grateful for your

support, even in the midst of your own battles.

To my children, Kyle, Kevin, Khaira, and Kobe, you are the inspiration behind everything I do. Thank you for bringing colour to otherwise bleak and ordinary days, for being patient and understanding when everything just seemed out of control, and for stepping up when I was the one who needed you. The things you all did to help out, and your hugs, kisses, prayers and encouragement, were more than appreciated.

Finally, I thank God for giving me the strength to complete this part of my journey, and for placing all the people, experiences, and the lessons I needed along this path, as my journey continues.

"Do the difficult things while they are easy and do the great things while they are small. A journey of a thousand miles must begin with a single step."

Lao Tzu

Table of Contents

List of Tables

List of Figures

Abstract

Purpose: This study aimed to investigate the efficacy of video self-modelling (VSM) intervention on the social communication skills of children with Autism Spectrum Disorder (ASD) in the home environment. The study further aimed to find out whether off-target responses decreased as target skills increased, and lastly, if acquisition of new social communication skills were maintained and generalised after withdrawal of treatment. Social validity and parental perception of generalisation of skills learned from VSM were likewise investigated.

Method: The study utilised a single subject, multiple baseline design, replicated across three participants with ASD, between ages 5 and 7 years. The Social Communication Questionnaire (SCQ) was conducted to confirm participant limitations in social communication, and identify target social communication skills for their VSM intervention. Baseline measures were obtained, and videos of each child engaging in appropriate aspects of their target skill with a family member, were created. Participants subsequently viewed their videos multiple times over five days, followed by a practice activity similar to their video each day. Short term maintenance was evaluated after intervention was withdrawn, followed by generalisation measures, and then six weeks after, long term maintenance evaluations. At the conclusion of the study, parents of each participant completed a follow-up questionnaire that assessed generalisation and social validity of the intervention process.

Conclusion: These findings support the efficacy of VSM on the improvement of social communication skills of children with ASD in the home setting. All participants demonstrated accelerated acquisition of target social communication skills, that were maintained over time and generalised across materials, people, settings and situations. Off-target responses likewise decreased as target responses increased. Finally, parents indicated that VSM intervention was a socially valid method they would consider for future applications.

Improving the social communication skills of children with autism through video self-modelling: An early efficacy study using single subject design

Introduction

Autism Spectrum Disorder

Autism Spectrum Disorder (ASD) is a neurodevelopmental condition distinguished by difficulties with social communication and adaptive skills. The hallmark features of ASD include deficits in the quality of communicative interactions, such as difficulties with initiating, responding and maintaining conversations, misinterpreting information and impairment in nonverbal communication (e.g. use of eye contact, gestures and facial expressions), impairments in sharing pleasure or joint attention, limitations with perspective-taking or making inferences, and difficulties with developing and maintaining age-appropriate social relationships (e.g. difficulty understanding social norms, initiating and maintaining friendships; Klin, 2006; Bellini, Peters, Benner & Hopf, 2007; Troyb, Knoch & Barton 2011; American Psychiatric Association [APA], 2013). Deficits in adaptive behaviours are often displayed as stereotyped or repetitive motor activities, such as ritualistic patterns or stimulatory behaviours (e.g. rocking, spinning, hand flapping), echolalia, memorised phrases or sentences, over indulgence in specific areas of interest, including preference for sameness that leads to difficulties coping with change, and an atypical reaction to sensory information (Klin, 2006; Troyb et al., 2011; Delano, 2007; APA, 2013).

The heterogeneity of ASD is highlighted as its characteristics manifest across a broad range of intellectual and language functions, and across diverse communicative, social and behavioural disabilities (Jones & Klin, 2009; South, Larson, White, Dana & Crowley, 2011). Behaviours associated with ASD exist in varying levels of severity often unique to each individual, from those with serious cognitive and language impairments, to those with more functional or higher cognitive and language skills (Sansosti & Powell-Smith, 2008). Regardless of cognitive abilities, individuals with ASD are inclined to exhibit inappropriate,

off-task or problem behaviours such as aggression, hyperactivity and anxiety, usually related to difficulties expressing their wants, needs or preferences, and understanding or responding to typically occurring or spontaneous interactions (Hagopian & Graham, 2009; Sukhodolsky et al., 2007). Additionally, Lecavalier, Leone & Wiltz (2006) demonstrate that severity of problem behaviours in ASD correlate with parental and caregiver stress, which subsequently impacts on voluntary access for essential support and intervention services (Karp et al., 2018).

According to the Diagnostic Statistical Manual of Mental Disorders, 5th Edition (DSM-5), diagnostic criteria for ASD must include symptoms that are observed from early childhood (APA, 2013). Similarly, the main criteria for Childhood Autism in the International Statistical Classification of Diseases and Related Health Problems, 10th Revision (ICD-10) emphasises the manifestation of impairment before the age of three years, in at least one of three areas; language, social attachments or reciprocal social interaction, and functional or symbolic play. According to the ICD-10, the child must also present at least six symptoms from a range of areas under three categories; impairments in social interaction, deficits in communication, and restricted, repetitive and stereotyped patterns of behaviour, interests and activities. Furthermore, these symptoms must be distinct from other types of pervasive developmental disorders (World Health Organization [WHO], 1994). Both diagnostic systems advocate for early recognition, identification and intervention, such that diagnostic procedures for ASD can now be reliably administered to children as young as 14 months old (Pierce et al., 2019). While believed to be a lifelong disability, Fein et al. (2013) substantiated that early intervention results to optimal outcomes in ASD, significantly improving the likelihood of a better quality of life for individuals and their families (Elder, Kreider, Brasher, & Ansell, 2017; Fein et al., 2013).

Previously considered as a rare condition, the incidence of ASD has seen an increase in recent years (Simms & Jin, 2015). According to a surveillance data gathered by the Centers for Disease Control and Prevention's (CDC) Autism and Developmental Disabilities

Monitoring (ADDM) Network, the incidence rose to an estimated one in 59 individuals diagnosed with ASD in the United States in 2014 (Baio et al., 2018) from an estimate of one in 68 individuals with ASD reported by the same government agency in 2010 (Christensen et al., 2014). In New Zealand, it is estimated that roughly 80,000 individuals are affected by the condition (Autism New Zealand Inc., 2019). Incidence ratios for ASD are reported to be one in 37 boys and one in 151 girls, suggesting that there are approximately four times more males than females diagnosed with ASD (Baio et al., 2018). The study by Baio et al. (2018) also noted that ASD can occur across gender, race or ethnicity, culture, and educational or socioeconomic background.

Psychometric assessments in people with ASD, including high functioning individuals, reveal specific strengths in the areas of rote learning, memory and visuo-spatial processing, particularly when tasks are associational and sequential, rather than contextual (Klin, Saulnier, Tsatsanis & Volkmar, 2005; Kushner, Bennetto, & Yost, 2007; Roser, Aslin, McKenzie, Zahra & Fiser, 2015; O'Riordan, Plaisted, Driver & Baron-Cohen, 2001; Lodhia, Suk, Lim, Hamm & Kirk, 2017). However, deficits are seen in abstract thinking, verbal concept formation, integration skills, verbal reasoning and social cognition (Klin, Saulnier, Tsatsanis & Volkmar, 2005), as well as difficulties with understanding and interpreting auditory information (O'Connor, 2011; Spears & Turner, 2011). This disinclination to integrate information globally (Kolderwyn, Jiang, Weigelt, & Kanwisher, 2013) and preference for rote and parts-to-whole visual associative processing, indicate the fragmented learning style associated with ASD, making it difficult for them to connect meaningful pieces of an activity, information, communicative experience or situation as coherent parts of a whole (i.e. weak central coherence; Frith, 2003; Klin, 2006).

In an early experimental study by Happe (1996), children with autism showed increased attention to visual detail, when they performed better than typical children and children with learning disabilities, on visual perception tasks involving common visual

illusions. Extending on previous observations that visual learning is enhanced in ASD, a study with adults by Roser et al. (2015) also infers similar results gained, from the participants' bias for sustained attention to specific details within a complex array of visual elements on a bigger picture. Additionally, a study by Booth and Happe (2010) showed that most children with ASD gave more local than global responses in a sentence completion task (e.g. "You can go hunting with a knife and …" "*fork*" as opposed to "*catch a bear*") demonstrating preference for detail rather than holistic processing of information. In an attempt to determine the process that cause this tendency for weak processing of general information, Plaisted, Saksida, Alcantara, and Weisblatt's (2003) double experiment, not only maintained the enhanced local processing skills in children with ASD, but also discovered an inefficient auditory filter in child participants, a characteristic more common in the hearing-impaired population. This may account for difficulty with speech perception in the presence of background noise (Alcantara, Weisblatt, Moore & Bolton, 2004) and sensitivity to certain acoustic frequencies in individuals with ASD, further resulting to a reduced ability to integrate verbal information (Alcantara et al., 2004; Plaisted et al., 2003). Building on these previous observations, empirical data on individuals with ASD further reveal atypical perception of sound features such as pitch, loudness, rate and prosody, displaying more prominent difficulties in auditory processing for speech than non-speech sounds (O'Connor, 2011; Kashino & Lin, 2016). Additionally, Ceponiene et al. (2003) discovered that children with ASD are able to perceive speech sounds, but found difficulty in orienting and attending to them. Aside from orientation and attentional deficits, children with ASD are also found to have difficulty shifting and re-engaging focus (Zwaigenbaum, et al., 2005; Antezana, Mosner, Troiani & Yerys, 2016), skills deemed essential for joint attention and social communication (Patten & Watson, 2011). Thus, the aurally relayed, transient nature of verbal information renders its processing and interpretation difficult and confusing for individuals with ASD (Hodgdon, 1995), yielding it an inefficient learning modality.

Hodgdon (2012) emphasises that the non-transient or permanent nature of visual material allows information to be available long enough for the learner to process it, or refocus back to it after disengagement, and establish it in memory. Visual material is thus usually remembered better (65%) than spoken information (10%), as it allows the learner to review cues repeatedly, facilitating understanding and decreasing reliance on adult prompts, and thus increasing independence (Hodgdon, 1995). Visual material also provides structure and predictability, and accommodates the preferred learning style of individuals with ASD (e.g. watching videos), enhancing their participation, comprehension and, ultimately, social communication (Hodgdon, 2000). A number of intervention strategies in support of children and adults with ASD are established behind the enhanced visual processing skills observed in most individuals with the condition (Quill, 2000; Corbett & Abdullah, 2005; Hodgdon, 2012). When Johnston, Nelson, Evans and Palazolo (2009) utilised visual supports to teach social initiation skills to three preschool-aged children with ASD, all the children participants were noted to initiate interaction and request to join in play activities. Likewise, off-task behaviours decreased, verbal language increased, and effects were maintained and generalised. The authors concluded that the intervention was effective in a naturalistic environment.

Individuals with ASD are noted to attend to special interests for prolonged periods of time (Corbett & Abdullah, 2005). Research show that special interests in ASD are more intense but does not necessarily mean less varied (Anthony et al., 2013; Cho et al., 2017). Particularly, Cho et al. (2017) recognised that adolescents with ASD were similarly interested in videos as typical adolescents. Winter-Messiers (2007) found strong positive correlation between special interest areas of children and adolescents with ASD to improvements in social, communication, emotional, sensory, and fine motor skills. Koegel, Kim, Koegel and Schwartzman (2013) also noted high levels of social engagement, initiation with peers, and skill generalisation, from adolescents with ASD, when their preferred interests were incorporated into ongoing activities. Thus, in teaching social communication skills to

individuals with ASD, the search for instructional strategies favouring the enhanced capacity for visual learning, that incorporates special interest areas, with decreased demands on domains of difficulty in learning acquisition, remains a highly relevant scope of research (Bauminger, 2002; Quill, 1997; Keenan, Thurston & Urbanska, 2017).

Components of Social Communication

Social communication occurs long before infants utter their first words. Contrary to the belief that social cognitive abilities develop much later, data reveals that awareness of the mental states of others (Apperly, 2011) and contextual word-object associations (Bergelson & Swingley, 2012) are present in infancy, emphasising that children learn social communication skills from birth, and continue to use them across the lifespan. Social communication, the understanding and use of verbal and nonverbal language in social situations, is motivated by conventional norms unique to each individual, family, community and culture (Curenton & Justice, 2004; Inglebret, Jones, & Pavel, 2008). Understanding the typical processes involved in social communication provides an understanding of its deficits and a basis for intervention development. Research suggest that effective social communication encompasses the successful integration of social interaction, social cognition, pragmatics and language processing (Adams, 2005; Niznikiewicz, 2013).

Social Interaction. Social interaction is described as the process of mutual influence effected by individuals over one another during social encounters (Little, 2016). It involves the effects of communication styles; language, culture and gender influences; language use or code switching (e.g. a multilingual speaker switching languages to accommodate the listener's language code); rules for linguistic etiquette; social reasoning; peer-related social competence; social activities such as participation in cooperative play or joining peer groups; conflict resolution; and patterns of social power or deference (e.g. social or gender status). Given that social interaction establishes the framework for communication and language competence (Tomasello, Carpenter, Call, Behne, & Moll, 2005), it thus serves as the

foundation for the development of intellectual, emotional, behavioural, higher sensory processes and cognitive functions (Frith, 2012). The intricate connection between social interaction and language in social communication requires a higher level of social cognition (Liszkowski, 2011).

Social Cognition. Social cognition refers to the mental processes responsible for perceiving, implementing and interpreting linguistic, auditory, visual and physical cues that provide emotional and interpersonal information, enabling the understanding or inferential decoding (of a speaker's intention after a message has been conveyed), planning actions and making decisions (relevant to existing social and moral norms, including consideration for other's welfare), and responding accordingly (Frith & Frith, 2007; Liszkowski, 2011; Suchy & Holdnack, 2013). The significance of social cognition in social competence is highlighted as a key factor that influences outcomes in education, employment (Jones, Greenberg & Crowley, 2015; Denham, Kalb, Warren-Khot, Rhoades & Bassett, 2013), mental (Carter et al., 2010; Ciarrochi, Scott, Deane & Heaven, 2003; Jones et al., 2015) and physical health (Uchino, 2006; Callaghan & Morrissey, 1993), and general well-being (Cacioppo, Capitano, Cacioppo, 2014). Upon social interaction, a series of processes are set in motion and the brain functions as a social information processing system (Dolan, 2002). Arioli, Crespi and Canessa (2018) pose that these distinct processes associated with social cognition can be categorised into three main domains: social perception, social understanding, and social decision-making.

Social perception refers to the early stages of social information processing related to detecting and analysing gaze direction, facial expressions, body movements, vocal tone and other forms of biological signals, to form accurate opinions about the intentions and dispositions of others (Allison, Puce & McCarthy, 2000). Mehu and Scherer (2012) present that emotion is an essential function of social signals, and that the receiver interprets these signals to be able to respond accordingly. The varied functions of social signals are expressed in different contexts, such as survival for an individual, communication in dyads, social

coordination in groups, and ultimately, culture in societies (Dolan, 2002). Vogeley (2017) confers that social signals or social cues (e.g. faces, eye gaze, emotional expression and body language) enable the differentiation between an object (with characteristics that are predictable and can be explained according to physical rules of nature) and a person (who is a living, thinking being with their own set of experiences, intentions, reasons and motivations, and whose behaviours are not always predictable). This initial role of social signals in social encounters leads to the occurrence of communication, which is pertinent for interactive exchange of information between at least two cognitive beings (i.e. persons), and not between objects or things (Vogeley, 2017). According to Frith and Frith (2007), a social encounter facilitates an exchange of signals that are either reflexive or deliberate. Reflexive signals are unconsciously generated by the sender and intuitively processed by the receiver, such that both are unaware of the social exchange. Most signals are reflexive or automatic in nature, basic, and nonverbal, and are critical for social learning especially during the first 12 months of life. Conversely, Frith and Frith adds, deliberate or conscious signals involve higher level social information processing, social awareness, and social understanding. Deliberate signalling requires the awareness of producing the signal and of its perceived effects on others, and respectively requires the receiver to be able to take the other person's perspective, for congruent reception of these signals. Deliberate signalling infers that both sender and receiver are aware of the exchange in social cues, and such signals may not always imply the genuine emotions for which they assume (e.g. a smile to signal embarrassment). High level social signals generally emerge in children from about 18 months old, and Frith and Frith propose, this coincides with the development of consciousness. Social perception is said to primarily involve the reflexive and intuitive, rather than deliberate, processes of social interaction (Frith & Frith, 2008), such as when infants refer to their mothers' facial expressions before deciding whether or not to draw near an object, during social referencing (Frith, 2008), or the natural physical and emotional contact between mother and child that

establishes engagement, imitation and empathy (Korkmaz, 2011). Empirical data expand that social learning, or learning by observing the experiences and behaviours of others so that one need not go through the same experiences, initially entails social attention, which is naturally directed to facial features (Frith & Frith, 2007; Kato & Konishi, 2013). Several investigations support this natural human predisposition for facial perception (McKone, Kanwasher & Duchaine, 2007; Adams, Albohn & Kveraga, 2017), and research likewise point to a holistic, rather than part-based, encoding of facial features (Maurer, Le Grand & Mondloch, 2002; Yovel & Kanwisher, 2004). The human face not only determines one's identity from its permanent features, such as age, gender, ethnicity, familiarity, attractiveness, and trustworthiness, but also provides predictive information from its non-constant features, such as one's emotional state and likely intent, through facial expressions and direction of eye gaze (Allison et al., 2000; McKone, Kanwasher & Duchaine, 2007; Adams, Albohn & Kveraga, 2017), which are typically used to regulate appropriate social responses (Adams et al., 2017). Evidence suggest that facial processing enables the universal identification of basic emotions, such as joy, sadness fear, disgust, surprise, anger (Ekman et al.,1987; Matsumoto, Keltner, Shiota, Frank & O'Sullivan, 2008), and more recently shame and embarrassment (Cordaro, et al., 2018). Together with body language processing (Dael, Mortillaro & Scherer, 2012), facial expressions allow for better emotional communication, motivating appropriate action or behaviour, such as upon recognising impending danger from a distance (Vuilleumier & Pourtois, 2007; Martinez, Falvello, Aviezer & Todorov, 2015). The eyes, in particular, attract the most attention than body postures or head movements (Adams & Nelson 2016). Gaze perception is significant in social learning as it provides a means for assessing an individual's interest in their environment, their emotional expression and likely intentions, making visual perception fundamental for later higher-level cognitive processing (Baron-Cohen, Joliffe, Mortimore & Robertson, 2006; Emery, 2000). Direction of eye gaze reveals an individual's attentional orientation (Emery, 2000; Fletcher-Watson, Leekam, Benson, Frank & Findlay,

2008), which, together with pointing, in triadic interactions, allow for sharing representations or perceptions of the world with another, and create space for communication through joint attention (Frith & Frith, 2007; Emery, 2000). Mutual gaze, or eye contact, directs dyadic interactions (Vogeley, 2017) and activates the mirroring (Rizzolatti & Sinigaglia, 2010) of facial expressions, allowing one to be able to experience the same emotions (Gallese, Keysers & Rizzolatti, 2004), such as for pain (Botvinick et al., 2005; Singer et al., 2004), fear (Adolphs, 2002) and disgust (Wicker et al., 2003). This mutual emotional experience enables the understanding, interpretation, and prediction of implied meaning of the actions and emotions of others, providing an occasion for empathy (Rizzolatti & Sinigaglia, 2010). Apart from gaze, facial expressions (Kaiser & Wehrle, 2001), hand motions, head movements, and body postures (Dael et al., 2012), evidence supports that voice (Scherer, 1995; Goudbeek & Scherer, 2010) and nonspeech vocalisations (e.g. laugh or scream), as well as vocal tone, prosody and intensity, are likewise found to be reliable for perceiving basic emotions (Schirmer & Adolphs, 2017). For more accurate and holistic emotion processing, these different sensory, motor and perceptual information are integrated (Mortillaro, Mehu and Scherer, 2013; Martinez et al, 2015) and registered into memory, where information can either stay or disappear completely (Dharani, 2015). It is said that the most emotionally relevant information usually captures attention and stays in memory (Brosch, Scherer, Grandjean & Sander, 2013). In social perception, behavioural intentions and meanings are perceived from the motor and expressive movements of another, without the need to assign mental states or intentionality (Gallagher & Hutto, 2008). This process encodes implicit or intuitive, lower level social information to facilitate explicit or conscious, higher-level social cognitive processing or social understanding (Mitchell, 2006; Meinhardt-Injac, Daum, Meinhardt & Periske, 2018; Mitchell & Phillips, 2015).

Social understanding, or *theory of mind* (ToM), is the attribution of mental states (i.e. mentalising or mindreading), such as beliefs, desires, intentions, emotions and motivations, to

oneself and others, supporting one's understanding of why people behave in certain ways, and guiding one's assumptions on how people will behave in the future (Kloo, Perner & Gritzer, 2010). It involves the conscious processing of social information. While basic social information processing provides input to these higher-level conscious processes, recent studies also point to a bidirectional neural mechanism interaction between the ToM system (i.e. higher-level cognitive processing) and the lower-level social perceptual processing system (Teufel, Fletcher & Davis, 2010). For instance, when an infant looks, smiles, and smiles back at the mother, demonstrating sensory perceptual and emotional processing, and consequently establishing an appropriate empathic response (Baron-Cohen & Cross, 1992). ToM develops from children's sense of self or self-awareness (i.e. the conscious realisation that one is different from other people and might have different likes, dislikes, beliefs and motivations) and the ability to pretend (e.g. during symbolic play), both of which involve a sense of self-reflection and representation of reality (Westby & Robinson, 2014). Human behaviour is inherently unpredictable, and for successful interactions, an attempt to understand the behaviours of others through their mental states by which we have no access to, necessitates the mentalising or mindreading process (Heyes & Frith, 2014; Gallagher & Hutto, 2008). Mentalising or ToM involves the complex interaction of a number of processes and different aspects of social understanding (Westby, 2014; Molenberghs et al, 2016). Recent neuroimaging and experimental studies demonstrate a multidimensional construct for ToM (Frith & Frith, 2003; Northoff et al., 2006; Abu-Akel & Shamay-Tsoory, 2011; Shamay-Tsoory, 2011; Molenberghs, Johnson, Henry & Mattingley, 2016) that delineates along cognitive, affective, intrapersonal and interpersonal components. Cognitive ToM involves the ability to make inferences about thoughts, knowledge, beliefs, motivations and intentions, while affective ToM involves thinking about and experiencing emotions (Dvash & Shamay-Tsoory, 2014; Molenberghs et al., 2010), and both can either refer to oneself (intrapersonal) or to others (interpersonal) (Lucariello, Durand, & Yarnell, 2007; Northoff et al., 2006; Tine

& Lucariello, 2012). ToM, as an abstract-cognitive skill that involves understanding other people's perspectives, is likewise differentiated from empathy, a rapid-emotional skill which involves the intuitive ability to share and understand the emotional states of others (Blair, 2008; Singer & Lamm, 2009). ToM and empathy are said to develop distinctly, although investigations show mechanisms for these processes overlap (Völlm et al., 2006; Bzdok et al., 2012). Accordingly, Shamay-Tsoory et al.'s (2010) model of empathy presents that affective ToM is an integration of cognitive ToM, and both the cognitive and affective aspects of empathy. In typical children, ToM develops in a predictable and sequential pattern (Frith & Frith, 2003; Call & Tomasello, 2008), forming its foundations from birth, when infants attend to their mothers' interactions and attempt to copy facial and oral movements (Westby & Robinson, 2014). These early imitation skills, often ascribed to mirror neuron functions (i.e. neurons that activate upon performance of an action or upon seeing another perform an action; Keysers & Fadiga, 2008; Keysers & Gazzola, 2014), are likewise considered to underpin the development of affective ToM (Gallagher & Hutto, 2008). In a study that measured differences in cognitive, affective and spontaneous ToM, Altschuler et al. (2018) recognised that difficulties with emotional reasoning (i.e. affective ToM) uniquely correlated to severity of social impairment in school-aged children with ASD. Additionally, Tine and Lucariello (2012) recognised that while both typically developing children and children with high-functioning ASD and Asperger syndrome demonstrated stronger intrapersonal than interpersonal (i.e. social) ToM in tasks, children with ASD and Asperger syndrome showed more severe social ToM impairment. There are two distinct mechanisms proposed to facilitate ToM, the implicit (i.e. action is anticipated in social context without deliberate reflection on others' mental states) and explicit (i.e. a cognitively demanding, conscious judgment of others' mental states) forms of ToM (Heyes & Frith, 2014; Matyjek, 2017). Implicit processes are said to be present in infants who attribute false beliefs to others from nonverbal behaviour (Scott & Baillargeon, 2017), while explicit mindreading, said to develop slowly in childhood,

is acquired from verbal learning through sociocultural transmission (Westby, 2014). Lastly, false belief attribution is commonly distinguished between *first-order* ToM, one's representation of another person's thoughts and emotions based on real events (Baron-Cohen, 2001) which is said to develop between the ages of four and five, and *second order* ToM, one's representation of another person's thoughts and emotions about somebody else's mental states, which typically develops by six years of age (Westby & Robinson, 2014). A review of investigations done on children's understanding of *second-order* mental states revealed that both language and *executive functions* (EF) have positive correlations with performance on *second-order* ToM (Miller, 2009). Early language development likewise predicts later ToM ability (Farrar & Maag, 2002), impacting on pragmatic language, perspective-taking, symbolic play, use of deception, event schemes, reading comprehension and written and verbal narratives. *Executive functions* (EF) refer to the conscious cognitive processes that facilitate goal-directed action, problem solving and self-monitoring. The core component processes for EF include *working memory* or being able to hold and manipulate information in mind, *inhibition* or the suppression of irrelevant information, and *cognitive flexibility* or being able to shift thoughts flexibly to new or different ideas (Garon, Bryson & Smith, 2008). Investigations support the significance of several EF skills for ToM (Korkmaz, 2011; Austin, Groppe & Elsner, 2014; Lecce, Bianco, Devine & Hughes, 2017; Pellicano, 2007), and while EF skills are said to develop independently from ToM especially in adulthood (Qureshi, Apperly & Samson, 2010), some functions develop together (Carlson et al., 2004). A longitudinal study recognised that early EF development was predictive of later ToM abilities, while early ToM was not typically predictive of EF skills (Carlson, Mandel & Williams, 2004). ToM is said to be dependent on memory functions, particularly autobiographical memory (i.e. individual memories of personal information and episodes of personal events), and some working memory, such as considering different thought perspectives before eventually framing ideas about others' mental states in social interactions (Korkmaz, 2011).

With the recent ToM framework, researchers have been able to distinctly describe specific ToM profiles in a range of psychiatric and behavioural conditions, including autism (Baron-Cohen, 2011), and together with similar studies, these results serve as basis for further development and implementation of future interventions (Westby & Robinson, 2014).

Social decision-making, a significant aspect of social interactions (Tomasello & Vaish, 2013), is the ability to process and select the best course of action from multiple options in social contexts, and is crucially influenced by one's ability to understand the behaviours of others based on their emotions, beliefs, dispositions and intentions in different social environments (Rilling & Sanfey, 2011; Frith & Singer, 2008). Evidence suggests that a number of brain regions included in what is known as the "social brain" (Baron-Cohen et al., 2000; Brothers, 1996; Schultz, Romanski, & Tsatsanis, 2000) are associated with moral judgment and social decision-making (Bar-On, Tranel, Denburg, & Bechara, 2003; Bechara, 2004). The mirror neuron system supports understanding of other's motor actions and action intentions, neural mechanisms for empathy support understanding and sharing emotions and sensations with others, and cognitive areas recruited in ToM support understanding of others' beliefs, desires and dispositions (Frith & Singer, 2008). Thus, a fundamental aspect of successful social decision-making and intention-based moral judgment involves the interaction of specific cognitive and emotional processes (i.e. reason and emotion; Komeda et al., 2016). Moreover, brain processes responsible for reward and reinforcement, pain and punishment, delaying gratification and emotion regulation are likewise commonly engaged in social decision-making. These areas often relate to deficits associated with ASD (Khalil, Tindle, Boraud, Moustafa & Karim, 2018),

Pragmatics. Pragmatics refer to the effective and appropriate ways (verbal and nonverbal) language is used in social situations based on conventionally understood contextual rules (Adams, 2005), to accomplish social goals, such as participating in speech acts (i.e. functional communication, e.g. greeting, requesting, apologising, promising), turn

taking (Levinson, 2006), applying rules of discourse, topic management, production of cohesive and relevant messages, and adjusting communication style to context (Adams, 2005). Pragmatic language, while considered as one of the language domains, develops distinctly such that deficits manifest even in individuals with good grasp of syntax, semantics and phonology (Young, Diehl, Morris, Hyman, & Bennetto, 2005).

Language Processing. Language is defined as the comprehension and use of a symbolic system (i.e. spoken, written, or other communication method such as sign language) for transmitting messages to others within the same group, social or cultural community (Amberg & Vause, 2010). In social interactions, language serves as a representation of one's thoughts, feelings, perceptions, ideas and beliefs, allowing one to be able to convey these to others (Maynard & Peräkylä, 2003). Successful social communication involves the effective and appropriate collaborative processing of receptive (i.e. listening and reading) and expressive (i.e. speaking and writing) language, with the different language domains (Berko Gleason, 2005): phonology (i.e. the speech sound patterns in a language), morphology (i.e. the smallest meaningful units of a language), syntax (i.e. grammar; the way words are combined to form sentences in a language), semantics (i.e. word meanings), and pragmatics (i.e. language use in social context and production of discourse). Moreover, language processing involves metalinguistic awareness for self-regulation and self-monitoring, and incorporates higher order language skills such as inferencing, comprehension monitoring, interpretation of complex, figurative or extended language (i.e. jokes, sarcasm, metaphors; Vulchanova, Saldana, Chahboun & Vulchanov, 2015), and knowledge of text structure (Gillon, 2004). Language processing also requires intact auditory processing, particularly with spoken language, since phonological awareness or the ability to manipulate speech sounds (i.e. phonemes; Lonigan & Shanahan, 2009) is particularly significant to reading and writing development (Gillon, 2004; Al Otaiba, Puranik, Zilkowski, & Curran, 2009; Lemons & Fuchs, 2010). Impairments in gestured, spoken, or written communication modalities often

require augmentative or alternative communication methods, such as visual strategies and technological communication devices (i.e. pictures, videos, computers or tablets) (Beukelman & Mirenda, 2013).

Social Communication Difficulties in Autism Spectrum Disorder

A consistent characteristic of individuals with ASD is the presence of social communication difficulties (Baron-Cohen, 1988; Frye, 2018; APA, 2013). The ability to respond to others' communication attempts and the frequency to initiate social interactions, considered integral to social communication and typical development (Adamson, McArthur, Markov, Dunbar & Bakeman, 2001; Bruinsma, Koegel & Koegel, 2004), are often lacking or limited in individuals with ASD (Leekam & Ramsden, 2006). Research shows that language and communication development significantly influence the identification, diagnosis, level of severity and understanding of ASD (Paul, 2008). An investigation by Loucas et al. (2008) corroborates the greater deficits in receptive language and functional communication in children with co-occurring ASD and language impairment, than in children with ASD without language impairment. Likewise, a number of studies indicate that early acquisition of language skills is regarded as a strong predictor for positive outcomes, including later social competence (Paul & Cohen, 1984; Sigman et al., 1999; Paul, Chawarska, Cichetti & Volkmar, 2008; Mody & Belliveau, 2013). In infants and young children with ASD, characteristic indicators may initially manifest as language acquisition that does not follow the usual pattern of development, where there is lack of or infrequent babbling and vocal play (Patten et al., 2014), limited motivation for intentional social communication (i.e. requesting, commenting; Maljaars et al., 2011), and impaired development of joint attention, attachment and other social interactive processes (Naber et al., 2007; Maljaars, Noens, Jansen, Scholte, & van Berckelaer-Onnes, 2011). For instance, gestures or hand-leading are used without eye contact to obtain a desired object, as if the hand, rather than the person, is responsible for achieving the desired item, demonstrating an incoherent learning style (Klin, 2006). A meta-

analysis of studies that used eye-tracking, pointed to visual attention of individuals with ASD as more inclined towards non-social (e.g. objects) than social (e.g. faces or people) stimuli (Chita-Tegmark, 2015), while similar results were concluded from a recent study by Ruta et al. (2017) showing that children with ASD were less responsive to social rewards, and displayed limited use of social communicative behaviours, such as eye contact and social smile, in a novel tablet-based task. In addition, an earlier study by Osterling & Dawson (1994) examined videotapes of children on their first birthdays, and disclosed that children with ASD performed fewer pointing, showing objects, looking at others and orienting to name, along with displaying significantly limited social behaviours and joint attention than typically developing peers.

Just as many children with ASD present delays in learning how to speak, others acquire verbal skills; however, a lot of them may be unable to use this skill appropriately for goal-directed social interactions, producing speech as an 'echo' from their environment (e.g. echolalia, the spontaneous repetition of another's vocalisations or verbalisations) rather than as a communicative venue, or merely using their words to communicate wants and needs (Mody & Belliveau, 2013). In addition, syntax and morphology of language may be intact, but speech may be nonreciprocal, inflexible, and lacking in vocabulary and semantic-pragmatic maturity (Klin, 2006). Individuals with ASD may likewise misinterpret the meaning of words and misunderstand what was said in context, or provide too much or too little information to their listener (De Marchena & Eigsti, 2016). While easily perceived as an expressive language impairment, the diminished social desire to communicate in individuals with ASD points to key deficits in pragmatic skills (Mody & Belliveau, 2013). A recent investigation on the relationships between domains on the Social Communication Questionnaire (SCQ; Rutter, Bailey & Lord, 2003) and the Strengths and Difficulties Questionnaire (SDQ; Goodman, 1997) revealed significant score differences among children with ASD and typical peers, indicating significantly lower score percentages in the pragmatic

language domain in children with ASD, relative to their abilities for reciprocal social interaction (Miranda, Berenguer, Roselló & Baixauli, 2019). Furthermore, findings from a systematic review of comparative studies on the pragmatic differences in conversational skills of individuals with ASD, consistently mentioned difficulties with topic maintenance and sharing relevant information, limited conversational initiations and responses, and the prominent use of stereotypic and repetitive language (Sng, Carter, & Stephenson, 2018). Similarly, an observational study on traditional dinnertime conversations of thirty families found that high functioning children with ASD initiated and commented less often, and made fewer conversational turns, with less frequent responses to communicative interactions from family members than typically developing children, suggesting an atypical pattern of communication (Jones & Schwartz, 2008).

Various theories attempt to explain the causes of social communicative deficits associated with ASD. Research point to difficulties with sustained attention, decreased rate of information processing (Mayes & Calhoun, 2007), impairment in speech prosody (Peppé, McCann, Gibbon, O'Hare, Rutherford, 2006; Shriberg et al., 2001), atypical emotional understanding of experiences (Losh & Capps, 2006; Pouw, Rieffe, Oosterveld, Huskens & Stockman, 2013), difficulties with self-monitoring, behaviour regulation, perspective-taking (Bierman, Torres, Domitrovich, Welsh, & Gest, 2009; Park & Lee, 2015, Williford, Whittaker, Vitiello, & Downer, 2013) and inferencing that results to literal interpretations of language (Loukusa et al., 2007), as well as the inclination to dwell on specific interests (Ruta, Mugno, D'Arrigo, Vitiello & Mazzone, 2010). These challenges reportedly relate to deficits in EF (McEvoy, Rogers & Pennington, 1993), and ToM, both essential for social understanding (Baron-Cohen, Leslie, & Frith 1985), with some studies indicating an underlying weakness in auditory processing (DePape, Hall, Tillmann & Trainor, 2012; Keehn, Kadlaskar, McNally Keehn & Francis, 2019). Investigations further recognise that these deficits in ToM are associated to weak central coherence in individuals with ASD

(Happe, 2011; Jarrold, Butler, Cottington & Jimenez, 2000; Frith, 2003). Likewise, impairment in imitation, which is a ToM precursor, is said to strongly correlate to the pragmatic language deficits in children with ASD (Miniscalco, Rudling, Raståm, Gillberg and Johnels, 2014).

Social decision-making in individuals with ASD can be exhausting, difficult and anxiety-provoking (Ahlstrom & Wentz, 2014; Hull, et al., 2017). Studies reveal that individuals with ASD did not only show difficulties in recognising emotions from facial expressions (Adolphs, Sears & Piven, 2001; Hobson, Ouston & Lee, 1988; Howard et al., 2000), but also in making social judgments from faces including decisions related to threat or otherwise, such as judging approachability or judging intelligence (Adolphs et al., 2001; Hall et al., 2010). Deficits in social decision-making and judging risks or others' intentions may have detrimental consequences to individuals, suggesting the need to address this goal as part of social communication skills intervention (Levin et al., 2015).

Social communication deficits in children and adults with ASD are often associated with increased levels of anxiety and stress than in typical population (Corbett, Schupp & Lanni, 2012; Ogawa, Lee, Yamaguchi, Shibata & Goto, 2016; Bishop-Fitzpatrick, Mazefsky, Eack & Minshew, 2017). Anxiety, stress levels, and depression in individuals with ASD correlate directly with age (Corbett et al., 2012; Van Steensel, Bogels & Perrin, 2011), cognitive functioning (White, Oswald, Ollendick & Scahill, 2009; De-la-Iglesia & Olivar, 2015), and familiarity of social situations (Lopata, Volkmer, Putnam, Thomeer & Nida, 2008). Additionally, Humphrey & Symes (2011) investigated peer interactions of young children with ASD in mainstream school, and found them to engage in more solitary behaviours, less cooperative interactions with peers, more reactive aggression towards peers, reduced participation in rough play, and were exposed to more occasions of verbal aggression from peers. Consequently, deficits in social interaction and communication predispose children with ASD to vulnerability, making them more susceptible to bullying (Wainscot,

Naylor, Sutcliffe, Tantam & Williams, 2008; Sofronoff, Dark & Stone, 2010), and further subject them to increased risk for trauma, exacerbation of ASD symptoms and/or development of other psychological disorders (Mehtar & Mukaddes, 2011; De-la-Iglesia & Olivar, 2015; Taylor & Gotham, 2016). Thus, the need for effective interventions that address social communication skills is apparent, in order to improve outcomes for individuals with ASD (Bishop-Fitzpatrick et al., 2017; Fuld, 2018).

Furthermore, parents of children with ASD tend to experience higher stress levels than parents of typically developing children (Ingersoll & Hambrick, 2011; Baker-Ericzén, Brookman_Frazee & Stahmer, 2005; Montes & Halterman, 2007) or those of children with other developmental disabilities (Griffith, Hastings, Nash & Hill, 2010; Pisula & Kossakowska, 2010), particularly relating to their children's social communication deficits (Davis & Carter, 2008), self-regulation and problem behaviours (Huang et al., 2014; Karst & Van Hecke, 2012). Parental concerns relating to social communication deficits (Chawarska et al., 2007) may result from difficulty understanding their children with ASD, who may have difficulty expressing their needs effectively, often triggering child problem behaviours (Ozsivadijan, Knott & Magiati, 2012; Hartley, Sikora & McCoy, 2008), as well as concern about their children's inability to report neglect and abuse in external circumstances (Ballan, 2012). Other burdens that contribute to parental stress include difficulties with finances and service access associated with childcare, treatment and community services, and support networks (Montes & Cianca, 2014). It is reported that parental involvement in the intervention of children with ASD not only increases frequency of intervention, but also increases the likelihood for generalisation (Burrell & Borrego, 2012), reduces parental stress, and increases parental self-efficacy (Feldman & Werner, 2002). Thus, effective interventions that target social communication skills in children with ASD must also be suitable for home-based application and parental implementation.

Current Interventions

Significant research has focused on the development of effective interventions to address the social communication deficits of individuals with ASD (Maglione et al., 2012; Wong et al., 2015). Given the heterogeneity of ASD, interventions that provide support for individuals' unique learning differences (Krasny, Williams, Provencal & Ozonoff, 2003) and address ASD core deficits early on (Corsello, 2005), are those that effectively lead to the most significant functional improvements and long-term outcomes (National Research Council [NRC], 2001), subsequently improving the quality of life of individuals and their families, and increasing social acceptance (Fein et al., 2013). A number of established interventions are noted to promote positive social communication outcomes for individuals with ASD, and can be categorised into comprehensive interventions, interventions that target specific populations (Maglione et al., 2012; Lord & Bishop, 2010), or focused intervention strategies (Smith & Iadarola, 2015; Lord & Bishop, 2010).

Comprehensive interventions, usually implemented following assessment within organisational and operational contexts, target multiple core areas of ASD, such as social communication, language, play skills and adaptive behaviour, with the application of intense (i.e. considerable number of hours), prolonged (i.e. transpires over one or more years) procedures, incorporating parent training to support maintenance and generalisation of skills (Odom, Boyd, Hall & Hume, 2010). Some comprehensive interventions focus on either behavioural or developmental learning, while others utilise a combination of both (Maglione et al., 2012). Among the comprehensive interventions identified in literature, behavioural approaches, generally based on the principles of learning, such as Applied Behaviour Analysis (ABA), are considered the most effective evidence-based options for individuals with ASD (NRC, 2001; Maglione et al., 2012; Schreibman & Ingersoll, 2005). These approaches assume that operant skills, such as social communication and play skills, can be learned or modified, in relation to antecedents and consequences (events that precede and

follow a behaviour), with the systematic presentation of reinforcement to increase frequency of desired behaviours. Adult-directed specific teaching strategies are utilised, such as shaping, modelling, prompting, chaining, and gradually fading reinforcement as learning occurs, in either dyadic, repetitive, highly structured instruction (i.e. discrete trial), or naturalistic, peer-interactive settings (Cooper, Heron & Heward, 1987). Other examples of behavioural approaches for social communicative learning include the Lovaas method (Smith, Groen, & Winn, 2000), Positive Behaviour Support (PBS; Carr et al., 2002), Incidental Teaching (McGee, Krantz, Mason & McClannahan, 1983), and Pivotal Response Training (PRT; Koegel, Koegel & Carter, 1999).

Alternatively, developmental approaches, though less evidenced, prove to be effective at addressing core ASD areas in small scale studies (Maglione, 2012; Corsello, 2005). These approaches consider that children with ASD acquire skills (e.g. social communication skills) in typical developmental sequence, using this pattern to assess a child's current level of competence, and guide intervention goals (Corsello, 2005) based on the identified zone of proximal development (i.e. learning potential just above the child's current abilities; Vygotsky, 1978). Developmental approaches are more child-directed, rely heavily on implementor abilities (e.g. parent, teacher or therapist), and address social communicative functions, such as joint attention and imitation, social engagement and involvement, gesturing and emotional cuing, complex problem-solving, symbolic interaction and turn-taking, abstract thinking and mental representations (Corsello, 2005; Ingersoll, 2010). Additionally, instead of prompts, the use of *scaffolding* (i.e. building on a child's existing knowledge by systematically breaking activities down to simpler steps for better approximations to achieve new learning) as a teaching strategy, is common in developmental interventions (Archer & Hughes, 2011; Ingersoll, 2010). Some examples of developmental interventions for individuals with ASD include DIR®/FloorTime® (Developmental Individual-differences and Relationship-based; Greenspan & Wieder, 1999) and the Hanen Programme (e.g. More Than

Words®; Sussman 1999), which both utilise the Developmental Social-Pragmatic (DSP) model, the LEAP (Learning Experiences - An Alternative Program for Preschoolers and Parents) (Strain & Hoyson, 2000) and TEACCH (Treatment and Education of Autism and Communication handicapped Children) models (Marcus, Schopler, & Lord, 2000), the Denver Model (Rogers, Hall, Osaki, Reaven, & Herbison, 2000), and the SCERTS® model (Social Communication, Emotional Regulation, and Transactional Support; Prizant, Wetherby, Rubin & Laurent, 2003).

Target-specific interventions for nonverbal populations or those with limited language, are evidenced to be effective at improving communicative initiations in children, such as through the Picture Exchange Communication System (PECS; Frost & Bondy, 2002; Sulzer-Azaroff, Hoffman, Horton, Bondy & Frost, 2009) and Augmentative and Alternative Communication systems (AAC), with the use of computers and other devices (Maglione et al., 2012). Additionally, there is increasing evidence in literature on the efficacy of interventions for high functioning children with ASD that address social communication, focusing on social skills, such as Social Stories (Gray, White & McAndrew, 2002; Feinberg, 2001; Quimbach, Lincoln, Feinberg-Gizzo, Ingersoll & Andrews, 2009), peer modelling (Laugeson, Frankel, Mogil & Drillon, 2009), and video modelling (Kroeger, Schultz & Newsom, 2007).

Focused intervention strategies are likewise operationally structured; however, contrary to comprehensive interventions, these approaches address distinct individual skills and occur in short durations (i.e. until achievement of individual goal; Odom et al., 2010). Evidence-based focused intervention approaches are often utilised to complement each other, as specific instructional strategies, that distinguish one comprehensive or targeted social communicative intervention from another (Wong et al., 2015). For instance, Discreet Trial Training (DTT; Pratt & Steward, 2018), Modelling, and Prompting, are significant aspects of a number of ABA approaches, and Peer-Mediated Intervention (Sperry, Neitzel, &

Engelhardt-Wells, 2010) is fundamental to the LEAP model (Strain & Bovey, 2011). Two independent reviews further establish the evidence base of a number of focused intervention practices for individuals with ASD (see Wong et al., 2015).

Among the evidence-based focused intervention practices commonly used in behavioural approaches for individuals with ASD are Antecedent-Based Interventions (ABI), which are preventative or proactive strategies used to modify the environment and remove conditions that usually elicit problem behaviours (Neitzel, 2009). An example of ABI is the use of *Visual Strategies* or *Visual Supports* (VS), likewise found to support learning in various skill areas, such as academic performance, behaviour, self-help skills, interaction and social communication (Odom et al., 2014; Cohen & Sloan, 2007). VS can either be movement-based, such as sign language, gestures or expressions, or materials-based (Tissot & Evans, 2003) such as assorted two- or three-dimensional representational tools (i.e. real objects or toys, tactile symbols, images or icons, photographs, videos, line drawings or written words) that illustrate information, assist in communication, and enhance understanding of concepts (Cohen & Sloan, 2007). The use of VS in interventions acquires its basis from empirical findings that social communication impairment in individuals with ASD points to deficits in social attention and shifting (von dem Hagen & Bright, 2017; Quill, 1997), auditory processing, particularly for speech sounds (Otto-Meyer, Krizman, White-Schwoch & Kraus, 2018), and cohesive integration of social information (Quill, 1997; Quill, 2000), with relative strengths in visual attention (Dakin & Frith, 2005; Simmons et al., 2009) and visual processing for non-social stimuli (Chita-Tegmark, 2015; von dem Hagen & Bright, 2017). These findings led to the development of various types of VS to facilitate learning in individuals with ASD, such as *Visual Task Analysis* (written text, pictures or videos that show a series of steps to complete a task), *Visual Schedules* (a series of pictures or a written list that inform about the sequence of events, such as in daily routines and timetables), and *Social Narratives* (pictorial or textual cues that support learning and understanding of appropriate

behaviours in social situations, e.g. *Social Stories*™ and *Social Scripts*). A number of studies recognise the positive effects of VS in improving social communication skills in individuals with ASD, such as the use of multicomponent visual cues for peer imitation (Ganz, Bourgeois, Flores & Campos, 2008), social scripts for verbal imitation (Ganz, Kaylor, Bourgeois & Hadden, 2008), visual picture and text cues for retelling of events (Murdock & Hobbs, 2011), social stories, written text cues, and video feedback for contingent responses, getting attention and initiating comments and requests during social interaction (Thiemann & Goldstein, 2001), and various visual strategy applications in social skills training (Bellini & Peters, 2008). The use of VS is likewise integral in a number of interventions such as in TEACCH, PECS, and other AAC systems.

Another type of VS is *Video Modelling* (VM), which is the video presentation of a model engaging in target skills to facilitate learning. VM has been successful at increasing social communication, among other skills, in individuals with ASD, whether used in isolation or complementary to other interventions (Ayres, Travers, Shepley & Cagliani, 2017). The strategy integrates the principles of modelling and visual learning through the use of video devices, promoting independence in children with little or no prompting (Hume, Loftin & Lantz, 2009). The implementation of VM requires minimal adult training, such that parents, teachers, or professionals are all able to successfully carry out the intervention (Charlop-Christy et al, 2000), and is likewise found to be applicable across varied ages (i.e. 3 - 20 years) and settings (i.e. home, school, clinic, and community) (Bellini & Akullian, 2007; Shukla-Mehta, Miller & Callahan, 2010).

Components of Video Modelling Interventions

Modelling and Observational Learning. As a visual strategy, *modelling* involves demonstrating a task or behaviour to an observer for the purpose of reinforcing learning through imitation (Wert, 2002), in either *active* (i.e. requiring social interaction, such as physical and verbal modelling or social responses, e.g. asking a child to repeat a word) or

passive (i.e. the learner observes without interacting, such as showing a video or watching others in order to learn a skill) ways (Biederman & Freedman, 2007). Modelling has been found to be successful at improving a range of skills in individuals with ASD (Laver & Wilkes-Gillan, 2018; Shukla-Mehta et al., 2010; Bellini & Akullian, 2007). The foundations of *modelling*, learning through observation, was first conceptualised in Albert Bandura's work on *social learning theory*, later renamed *social cognitive theory*, initiating that children learn by observing how others behave and how they react to the consequences of their actions, that then serve to guide future behaviour in similar experiences (Bandura, 1977; Bandura, 1986; Ozerk & Ozerk, 2015; McLeod, 2016).

Learning from observation involves both behavioural and cognitive processes, initially requiring having a role model representing an action. Highly valued models are deemed to possess similar observer attributes, such as age, gender, beliefs, and abilities, and are performing slightly beyond the observer's skill level (Bandura, 1977). Identifying with role models is said to encourage increased attention and imitation of the action represented, as well as enhanced encoding and retention of the action into memory for later retrieval. The reproduction or imitation of the action then ensues, which involves understanding and making inferences about other's behaviours (i.e. social information processing; Meltzoff & Decety, 2003), influencing the decision to imitate a previously observed action relative to its perceived reward and punishment. An observer is apparently motivated to imitate an action deemed rewarding and appropriate, and further generalises the skill upon repeated reinforcement (Bandura, 1977; Petrosini, 2007; Meltzoff, Kuhl, Movellan & Sejnowski, 2009; McLeod, 2016). In intervention therefore, the application of modelling or observational learning, requires the learner to have acquired some level of imitation; However, observational learning is said to vary from imitative learning, in that, the copying of an action or behaviour is not always required, as learning can happen even without direct reinforcement (e.g. an observer will learn from, but not copy, an unwanted behaviour with observed negative

consequences), and skills will typically generalise to other settings (Bandura, Ross & Ross, 1963; Bandura,1977).

The social communication deficits in ASD highlight difficulties in social attention and shifting, information processing, and other social cognitive processes (Mayes & Calhoun, 2007; Bierman et al., 2009; Park & Lee, 2015; Williford et al., 2013), with predisposition to increased levels of social anxiety and phobias (Corbett et al., 2012; Ogawa et al., 2016; Bishop-Fitzpatrick et al., 2016), supporting the notion that learning by passive (e.g. video modelling), rather than active (e.g. face-to-face or live instruction) modelling may be easier for individuals with ASD (Ogle, 2012).

Imitation. The role of imitation in social learning is multifaceted, engaging varied cognitive and social abilities (Vivanti & Hamilton, 2014; Nadel, 2015; Ingersoll, 2008b), with recent studies mentioning the recruitment of mirror neuron functions (Rizzolatti, Fadiga, Fogassi & Gallese, 2002; Rizzolatti, Fogassi & Gallese, 2006; Foti et al., 2014; Foti et al., 2019; Williams, Whiten, Suddendorf & Perret, 2001). Some research findings on observational learning and imitation indicate that individuals with ASD displayed limited or impaired imitation of various activities (Edwards, 2014; Williams et al., 2001; Vivanti & Hamilton, 2014), with less naturalistic spontaneous, than structured elicited imitation (Ingersoll, 2008a; Stone, Ulman, Swanson, McMahon & Turner, 2004). Others indicate better imitation of meaningful than nonmeaningful movements or gestures (Vivanti & Hamilton, 2014; Cossu et al., 2012; Oberman, Ramachandran, & Pineda, 2008), and increased imitation on behaviours (echopraxia) and speech (echolalia) of others, without understanding the context and meaning of these actions (Williams et al., 2004; Bellini and Akullian, 2007; Ledford, Gast, Luscre & Ayres, 2008). An analysis of observational learning and learning by doing found that high functioning children with ASD were impaired in learning by trial and error, and were as efficient as typically developing children in learning by observation. However, children with ASD showed susceptibility for hyperimitation, indicating impaired

imitative behaviour control (Foti et al., 2014), which is potentially ascribed to atypical mirror neuron development (Foti et al., 2019). On the other hand, a study that found similar results, infers this automatic imitation in individuals with ASD, to reduced ToM abilities (Spengler, Bird & Brass, 2010). Additionally, a neuroimaging report indicates that both the mirror neuron and ToM systems have complementary functions during social interaction (Sperduti, Guionnet, Fossati & Nadel, 2014). Despite representational differences for the social imitative deficits in ASD, the process of imitation in social learning, nevertheless requires, not only determining the type of model (i.e. who and what to model), but likewise having a clear frame of reference (i.e. understanding the context and viewpoint) that impacts the outcomes for both model and observer (McCoy & Hermansen, 2007). The limitations with social understanding in individuals with ASD, is thus supported with the use of visual strategies (e.g. video modelling), by providing the appropriate frame of reference for an identified learning goal (Bandura, 1971; McCoy & Hermansen, 2007).

Zone of Proximal Development. The zone of proximal development is the gap between the skills that a learner is able to achieve independently and those that a learner is able to achieve with interaction, assistance, guidance and encouragement, from someone who is more competent or knowledgeable (Vygotsky, 1978). The term *proximal* refers to those skills that are not yet mastered but are within the learner's repertoire, and have the potential to be mastered. Vygotsky recommends presenting tasks within a learner's zone of proximal development, such that the learner only needs the appropriate support to successfully achieve them (McLeod, 2019). Thus, for a video modelling intervention to be successful, it is vital to identify a learner's zone of proximal development and present a video model that represents skills within a child's area of proximal learning (Ogle, 2012).

Self-efficacy. *Self-efficacy* is the belief in one's own capabilities or competencies to achieve success and control over one's accomplishments and over particular situations (Bandura, 1994). Bandura further explains that these beliefs determine how an individual

feels, thinks, self-motivates, and behaves in relation to experiences, events, or achievements. An individual with high levels of self-efficacy beliefs will regard difficult tasks as challenges to overcome, rather than threats to be avoided, and will maintain the efforts to succeed even with repeated failed attempts, subsequently enhancing personal accomplishment and well-being. Conversely, Bandura (1994) continues, individuals who doubt their capabilities tend to give up easily after a failed attempt, are slow to recover, and are subsequently predisposed to high levels of stress. Bandura expounds that the four main sources for self-efficacy development include, mastery experiences (i.e. repeated experiences of overcoming failure through perseverance, leading to a sense of resilience), seeing individuals similar to oneself succeed (leading one to believe in their own capability to succeed, wherein the greater similarity there is between learner and model, the more persuasive the self-efficacy effects), social persuasion (i.e. expressing positive appraisals that increase an individual's self-belief, which includes setting activities up so a learner will succeed, and measuring success in terms of self-improvement rather than conquest over others), and reduction of stress reactions (i.e. an individual's mood and internal state influences one's judgements of personal self-efficacy, e.g. positive mood strengthens self-efficacy beliefs, while negative tendencies weaken it). Thus, the depiction of an individual similar to the learner performing a task with high accuracy in a video model, therefore strengthens a learner's sense of self-efficacy, and increases the likelihood of learning acquisition (Dowrick, 2012).

Video Modelling (VM) Interventions

Video interventions are consistently gaining popularity as methods for teaching children with ASD in various settings (Shukla-Mehta et al., 2010). It rose in popularity, possibly with the advancement in video editing technology, during the 1990's (Buggey & Ogle, 2012). Parallel to the development of digital technology, it has been observed that the electronic screen has become an object of high interest for many children and adolescents with ASD. They may prefer this medium of information acquisition as it is repetitive,

predictable, and easily customisable to individual interests, providing visual and auditory stimulation, contrary to face-to-face interactions (Mazurek, Shattuck, Wagner & Cooper, 2012; Aresti-Bartolome & Garcia-Zapirain, 2014). Studies report that children and adolescents with ASD tend to spend more time in front of computers and on video games than typical peers (Mazurek et al., 2012; Kuo, Orsmond, Coster & Cohn, 2014; MacMullan, Lunsky & Weiss, 2016), with less time on social media or socially interactive electronic games (Mazurek & Wenstrup, 2013). Although risks have been identified with technology use (Chassiakos et al., 2016; Mazurek & Engelhardt, 2013), some benefits have likewise been reported. In fact, a recent study described the positive influence of digital technology by the self-report of secondary students with ASD, on the varied ways they utilise electronic devices to improve learning, communication, organisation, independence, social opportunities and stress reduction (Hedges et al., 2018).

Video modelling (VM), a form of video-based intervention that integrates the principles of modelling and visual learning, is recognised as an effective, evidence-based intervention method for teaching a range of various skills in individuals with ASD. Existing research demonstrate that VM has been utilised to address various social communication goals such as affective response (Couloura & Kymissis, 2005), social initiations (Wert & Neisworth, 2003), symbolic and reciprocal play (Charlop-Christy, Le & Freeman, 2000; D'Ateno, Mangiapanello, & Taylor, 2003; MacDonald, Clark, Garrigan, & Vangala, 2005), perspective taking (LeBlanc et al., 2003), social skills (Buggey, 2005; Nikopoulos & Keenan, 2007; Simpson, Langone & Ayres, 2004) conversation, functional skills and social initiation (Ayres & Langone, 2005; Bellini & Akullian, 2007; Shukla-Mehta et al., 2010). VM utilises the principles of observational learning by providing a visual model of target skills being performed successfully within the zone of proximal development, through video recording technology (Bellini & Akullian, 2007; Corbett & Abdullah, 2005; Franzone & Collet-Klingenberg, 2008). In contrast to live modelling, VM is said to facilitate rapid acquisition of

skills, supporting imitation and increased generalisation, as it complements the visual strengths of many individuals with ASD (Bandura, 1971; Charlop-Christy et al., 2000; McCoy & Hermansen, 2007; Corbett & Abdullah, 2005). VM also allows for removal of irrelevant details while focusing on the more significant aspects of the target skill (Bellini & Akullian, 2007), and enables implementation of intervention with minimal adult supervision, thus encouraging independence (Hitchcock, Dowrick & Prater, 2003; Buggey, 2005; Cambell et al., 2015). Among many visually-cued learning strategies, VM is cited as a more interesting, flexible, cost-effective, easier to produce and reproduce, and less socially demanding method for teaching children with ASD (Charlop-Christy, Le, & Freeman, 2000; Hitchcock et al., 2003).

The different types of VM include basic video modelling, video self-modelling, point-of-view modelling and video prompting. *Basic VM* is the video recording of models other than the learner (e.g. adults or peers) engaging in target behaviours, which is then replayed for later viewing by the learner. Conversely, *Video Self-Modelling* (VSM) utilises the learner as model in the video recording, performing target skills, which is likewise viewed by the learner at a later time. *Point-of-view* VM is the presentation of a video record that focuses on the perspective of what the observer will see when performing the target skill, while *Video Prompting* utilises either others or self as models, and involves video recording segments of the target skill with pauses in between, to accommodate learner attempts at each step before viewing the next one (Franzone & Collet-Klingenberg, 2008).

Bandura (1971) suggests that the most effective video modelling methods are the use of peer and self as video models in interventions, given that these methods utilise the most similar models to the observer. A number of studies that compared peer-modelling with self-modelling in video presented interventions conclude that both are equally effective in teaching new skills and behaviours to individuals across varied age groups (Decker & Buggey, 2012; Buggey & Ogle, 2012; Ozkan, 2013; Sherer, et. al., 2001; Cox, 2018; Bellini

& Akullian, 2007; Mason et al., 2012), although less effective with children under 4 years old (Buggey & Ogle, 2012). However, video self-modelling (VSM) has been considered more efficient in some cases (Marcus Wilder, 2009), relative to the child's capacity for self-recognition, which is said to account for learner attention and motivation in video viewing and imitation (Buggy, 1977).

Video Self-Modelling (VSM)

Video self-modelling (VSM) allows learners the repeated viewing of themselves successfully engaging in positive or new behaviours that are slightly beyond their actual skill level, or within their zone of proximal learning (Buggey, 2012). The use of self-modelling was initiated in the 1970's as an alternative observational learning method for positive behaviour change in a child, when an appropriate peer model was difficult to find (Creer & Miklich, 1970). Bandura (1971) states that children will imitate a model who is similar to themselves in many ways even without reinforcement, expanding that there is no other model more similar to a child, than the child himself or herself. VSM then becomes productive at obtaining the child's attention, particularly for those who enjoy viewing themselves, thus inspiring motivation, prompting imitation, and promoting generalisation of acquired skills. VSM is considered an empirically-based learning method (Sherer et al, 2013) that is preferentially effective for children with ASD, as the method accommodates their learning styles. It is unobtrusive to the child's natural environment, without needing the consistent reproduction of intervention materials (Hitchcock et al., 2003), and is less time-consuming than other interventions (Delano, 2007; Wynkoop, 2016), revealing immediate effects within the first three viewings (Root, 2017; Cardon & Wilcox, 2011; Kehle, Bray, Margiano, Theodore, & Zhou, 2002). Dowrick (2012b) proposes that VSM encourages faster acquisition of skills, as it supports self-efficacy, by presenting the learner as the video model, engaged in errorless performance of the target skill. The VSM method has been widely applied with positive results in many disciplines, to address the functional learning of language, play,

cognitive and adaptive skills across the lifespan, with and without other interventions (Corbet & Abdullah, 2005; Bellini & Akullian, 2007; Ayres & Langone, 2007; Nicopoulos & Keenan,2003; Delano, 2007; Shukla-Mehta et al., 2010; Mason, Davis, Ayres, Davis, & Mason, 2016; Kabashi & Kaczmarek, 2017; Davis, 2019).

Advancement in digital technology has given rise to portable tablets, smartphones and handheld devices, that combine the functions of a digital camera, video recorder, music player, and mobile phone in one gadget. Smartphones today are able to utilise multiple applications at the same time, have better memory capacities, and more powerful systems that produce high quality photos and videos at the touch of a button or screen, compared to technological resources ten years ago (Andrew, 2018). From VCRs as video recording devices using in-camera editing, to the advent of various video editing application programmes, such as the iMovieHD® (Apple®), MovieMaker (Microsoft® for PC), or other newer alternatives, the process of video recording, editing and presentation has become more accessible and easier over the years. In particular, producing video modelled interventions requires minimal equipment and technological skill, making it feasible for application in different settings and by different implementors (Goodwyn, Hatton, Vannest & Ganz, 2013).

The production of a self-modelled video for intervention involves filming the individual and editing the video to remove evidence of inappropriate behaviours and irrelevant adult prompts. The video then depicts the learner performing positive aspects of a behaviour that surpass current skill levels (Buggey & Ogle, 2012). Creating video representations of a learner's advanced skills involve video recording a child's role play or imitation of target behaviour, relative to the learner's level of functioning. When role playing is difficult or imitation is limited, video recording a learner's behaviour over a period of time can be arranged so that a selection of the child's best behaviours is available. The video is then edited by cropping out unwanted aspects of the film, and stitching together the best representations of the learner's behaviour into a short video for viewing. Keeping the video

setting constant or specific such that the child stays in the same area during filming, lessens the time consumed in the application of this method (Buggey, Toombs, Gardener, & Cervetti, 1999; Buggey & Ogle, 2012).

Common features of VSM interventions include, edited videos that are approximately 2-4 minutes long (Buggey, 2005), creation of several videos illustrating target skill in different contexts similar to the actual intervention setting, video viewing done consistently in the same setting and immediately before target skill practice (Delano, 2007), and opportunities for target skill practice following video viewing (Ganz et al., 2013). Apparently, the frequency of video viewing does not impact VSM intervention outcomes (Shukla-Mehta et al., 2010; Dowrick, 2012). Existing literature mentions different forms of VSM interventions, such as *Video Feedback* (Griffiths, 1974; Dillon, 2008; Suby, 2009), *Positive self-review*, and *Feedforward* (Hitchcock et al., 2003; Dowrick, 2012).

Video Feedback. *Video feedback* is a form of VSM, also called *video replay*, that involves viewing an unedited version of self-modeling, where learners are able to see all aspects of their behaviours (i.e. both positive and negative aspects, or both successes and mistakes). Production of this method is relatively easy as the video recorder may be left turned on over a period of time, such that it captures all aspects of the learner's behaviours (Wert, 2002). It has been used unsuccessfully in earlier studies with potentially dangerous results, when negative behaviours were viewed by alcoholics that resulted to increased drinking patterns (Schaefer, Sobell & Sobell, 1972), but seemed to be effective in coaching sports or teaching physical activity training (Menickelli, Landin, Grisham & Herbert, 2000; Menickelli, 2004; Dillon, 2008), as well as for the self-observation of parents during a parent-implemented ASD intervention training (Ence, 2012).

Positive Self-Review. *Self-review* likewise involves viewing an unedited collection of a learner's best performances, video recorded over time. This method involves a learner who has well-developed skills, as this requires capturing all behaviours of the learner in video. In

the application of the *positive self-review* method, a learner's repertoire must include the target behaviour. This method has been used successfully in sports training for visual imaging (Buggey, 2009), and in preschool and school-aged children with ASD, for social communication and behaviour intervention (Mason et al., 2016).

Video Feedforward. Among the different forms of VSM, *feedforward* is attributed with the rapid learning acquisition of target skills, where learners watch edited videos of themselves achieving a future goal or performing new behaviours (Dowrick, 2012a, 2012b). This method is used for learners who do not possess the target skill yet, but whose repertoire includes crude aspects of the target skill. *Feedforward* involves video recording prompted behaviours, editing out segments of adult prompts in the video, and stitching together clips of positive behaviours into a short video for later viewing. This method is shown to be successful in addressing various skills in different settings and with varied populations (Wert & Neisworth, 2003; Fragale, 2014; Tsui & Rutherford, 2014; Lemmon & Green, 2015). For instance, an efficacy study of the video feedforward method on participants with no existing functional communication, by Smith, Hand & Dowrick (2014), found that two nonverbal children with ASD who had long histories of PECS failure, and a nonverbal man with Down syndrome, acquired target skills rapidly and generalised them without the need for additional intervention. According to Dowrick (2012a; 2012b), a self-model video feedforward intervention, or learning from an image of one's future performance, enables a mental replica of the action or skill that then shapes the behavioural response, increasing mirror neuron activity in individuals with ASD, thus, promoting imitation and engagement.

Review of Video Self-Modelling Intervention for Social Communication in ASD

As a core deficit in ASD, emphasis on social communication is recommended in goal development and intervention planning (WHO, 2018; Ministries of Health and Education [MHE], 2016). The applicability and efficacy of VSM intervention for individuals with ASD has been mentioned in literature for nearly five decades (Buggey & Ogle, 2012; Bellini &

Akullian, 2007; Cox, 2018), particularly for social communication skills; However, the progress of its application has been relatively slow (Buggey & Ogle, 2012). In order to identify existing research that explored the application of VSM intervention focusing on social communication skills in individuals with ASD, a literature search was conducted using the following databases: PubMed, PsycINFO, PsycARTICLES, Science Direct, ERIC and Google Scholar. A combination of key words used in the search included "video", "self-model", "self modeling", "video self modeling", "VSM", "autism", "autism spectrum", "ASD", "social", "social skills", "communication", "social communication", and "intervention". The search was restricted to English language peer-reviewed studies published between 2009 and 2019, to limit overlap with previous reviews included in this thesis, and contain only the most recent studies. Findings from a previous review (Shukla-Mehta et al., 2010) formed part of the summary under 'Previous Review', but was not included in the table.

Table 1. *Video Self-Modelling Interventions for Social Communication Skills in ASD*

Author(s) and Date	Study Design	Participant(s)	Target Social Communication Skill	Setting(s)	Intervention Components	Findings
Andrade (2018)	Single subject multiple baseline across participants	3 males; 5-6 years; High Fxn	Spontaneous verbal initiations; Contingent responses; Duration of social interactions.	School	2-3 minute edited videos for 2 students and 2 separate videos for 1 student; Cooperative math activities with peers; Video viewing intervention sessions spaced 48 hours apart.	No defensible intervention effects; Target social communication skills perceived likely to be beyond the current skill sets for the context; Follow-up after 2 weeks for 2 students only.
Boudreau and Harvey (2013)	Multiple baseline across participants	3 males; 4-7 years	Social initiations	School	6-7 minute video; Social initiations recorded on a partial interval recording system during the first 10 minutes after video viewing.	Increased levels of play initiations, similar to typically developing peers
Buggey (2012)	Multiple baseline across participants	3 males; 3-4 years	Social initiations at the playground	Private preschool	2-3-minute video viewed once a day for 5 days, and another 5 days at follow-up.	No change in behavior
Buggey, Hoomes, Sherberger, and Williams, (2011)	Single-subject multiple baseline design across participants	4 children (2 males, 2 females); 3-4 years; Moderate to low Fxn	Social initiations during playground time	Preschool	2.5-3.5-minute video; 2-week intervention phase; 15 minute observations during playground time.	3 out of 4 children increased frequency of social initiations and were maintained; No effect for one child, who was the youngest subject (3years 10 months).
Davis (2019)	Multiple baseline design across participants	3 adult males; 29-32 years	Initiate greetings in the workplace	Vocational setting / workplace	VSM with Behaviour Skills Training (BST); Participants were verbally instructed, video was viewed, steps were rehearsed, and verbal feedback provided; Used prompts and pauses to clarify steps before practice.	All participants increased percentage of frequency for initiating greetings; Two participants achieved mastery

Table 1. *Video Self-Modelling (VSM) Interventions for Social Communication Skills in ASD continued*

Author(s) and Date	Study Design	Participant(s)	Target Social Communication Skill	Setting(s)	Intervention Components	Findings
Kabashi and Epstein (2017)	Case study, single subject, multiple baseline design	1 male; 5 years; no Fxn specified; speech-language impairment; Able to follow 1-2 step directions and respond in phrases and sentences	Social interaction with peer: approaching, greeting, inviting, interaction with peer	Early childhood inclusive classroom	VSM with video feedback using iPad (verbal praise provided while watching video); Generalisation assessed across different setting, activities and peer; maintenance evaluation after one month; Social validity included.	Increased all aspects of social interaction, and effects maintained and generalised; Parents and teachers report to be socially valid.
Kabashi and Kaczmarek (2017)	Multiple probe single subject design across participants	2 children (1 male and 1 female; 3 - 5 years; Mild to moderate Fxn	Social initiations: greeting, mands (requesting)	Therapy centre	Used VSM alone and VSM with video feedback; Participant did not evaluate own performance, rather verbal feedback of positive behaviours provided upon video replay; Peers were utilised as part of intervention; Prompting was provided; Short and long-term maintenance, generalisation and social validity components.	Social initiations increased for 2 of the 3 children, which were maintained and generalised; Started with 3 children but 1 child who had severe Fxn was withdrawn after 15th intervention session due to not meeting criteria; Positive parent report for social validity.
Lee, Lo and Lo (2017)	Single case multiple probe design across three sets of toys	1 male child; 5 years; Understood Mandarin and English	Functional play skills: 3 toy sets - Farm toys, Doctor's clinic toys, and Rescue toys.	Home	2-minute total video, includes 45-50 second video for each toy set, presented one after the other.	Functional play skills increased across toys which were maintained 1 and 2 weeks after; Slight improvement with generalisation toys.

Table 1. *Video Self-Modelling (VSM) Interventions for Social Communication Skills in ASD continued*

Author(s) and Date	Study Design	Partiipants	Target Social Communication Skill	Setting(s)	Intervention Components	Findings
Lemmon and Green (2015)	Multiple treatment design; initial baseline (A) followed by three related sequential video interventions (B1, B2, and B3) and a follow up phase (C)	1 male child; 4 years 9 months; High receptive, low expressive language	Inviting others to play; Engaging in positive communication; Sustaining interactions with peers; Reduce aggressive behaviours.	Preschool	VSM intervention for each of the target skills presented sequentially; Peers included as part of intervention; Follow -up data collected 3 weeks after the 3rd target skill intervention.	Positive effects on all target skills likewise decreased aggressive behaviours; Positive social validity as evaluated via post study parent and teacher questionnaires.
Litras, Moore, & Anderson (2010)	Multiple baseline across behaviors	1 male child; 3 years 5 months; Mild to Moderate Fxn	Greeting; Making invitation to play; Contingent responding; Verbal communication; Social engagement/interaction.	Home	Video self-modelled social story; Use of text and voice-over of aged-matched peer for explicit rules; 50-minute observation sessions with in-vivo activities and free play; Initial verbal prompting for Greeting skill; Generalisation assessed through free play.	VSM Social Stories were successful in improving all areas, & generalized across settings, toys, and peers
McFee (2010)	Multiple baseline across participants	4 children (2males, 2 females); 7-8 years; High Fxn	Social initiations and social responses	School	VSM condition followed by behaviour skills training (BST) during table top game and no game conditions: instructions, modeling, rehearsal and feedback; Generalisation measured across people.	Increased over all social skills for all participants; Follow-up (Generalisation) after 3 weeks showed social interactions remained higher than baseline, but slightly lower than intervention levels.

Table 1. *Video Self-Modelling (VSM) Interventions for Social Communication Skills in ASD continued*

Author(s) and Date	Study Design	Participants	Target Social Communication Skill	Setting(s)	Intervention Components	Findings
Tsui and Rutherford (2014)	Comparing behaviour before and after the 4-week intervention.	1 male adult; 30 years old but diagnosed with ASD at 2 years.	Prosocial behaviours: Initiating handshake with eye contact, greeting politely, keeping a distance away when being greeted; Decrease unwanted behaviours (invading others' personal space and making loud noises).	Non-residential facility	3 minute video of prosocial behaviours with narration; Video viewing 3 times a week for 4 weeks, praised after watching; 10-15 minutes practice period after video viewing; Postintervention video recording after 4 weeks; Follow-up interview with staff members.	Decrease in negative behaviours noted but no significant changes with making eye contact, responding to requests, or questions; Staff report participant was easier to redirect and more likely to make eye contact during greetings.
Williamson, Casey, Robertson and Buggey (2013)	Single subject multiple baseline across time and participants	3 students (2 males, 1 female); 6^{th}-8^{th} grade; significant cognitive, language and communication delays relative to age.	Initiations of interpersonal greetings	School	Video viewing once a day after lunch; Video length unspecified; VSM instruction using iPad app and other handheld mobile assistive technologies;	Only 1 of the 3 participants showed an increase in self-initiated greetings, who also continued to initiate greetings during follow-up after intervention was withdrawn.

Note. ASD = Autism Spectrum Disorder; Fxn = Functioning Level

Synthesis of Study Findings

Previous Review. The review by Shukla-Mehta et al. (2010) included literature between 1980 and 2008, and found seven, out of 26 efficacy studies on VSM for social communication skills in individuals with ASD. Four of the seven studies utilised VSM exclusively, without additional intervention components (i.e. prompts, reinforcers and self-monitoring), to address either social initiations, requesting, social engagement, or responding to questions in the home and school environments (Bellini et al., 2007; Buggey et al., 1999; Buggey, 2005; Wert & Neisworth, 2003). The three remaining studies utilised VSM either with peer VM in the home and clinical contexts (Sherer et al., 2001), or as part of a primarily VM intervention, one with video feedback that addressed social initiation and verbalisation of a five-year-old child in the home setting (Maione & Mirenda, 2006), and the other as an alternative for one of seven participants in a VM investigation that addressed latency of social initiation and duration of appropriate play in the school setting (Nikopoulos & Keenan, 2003).

The four exclusively VSM studies had a total of 14 participants combined, with ages that ranged from 3 to 11 years. Increased target responses were observed on all participants, which were maintained on two studies (Wert & Neisworth, 2003; Bellini et al., 2007), but decreased on the other two (Buggey, et al., 1999; Buggey, 2005), after intervention was withdrawn. Shukla-Mehta et al.'s (2010) review indicates that there have been relatively few studies done on VSM for the social communication skills of individuals with ASD from 1980 to 2008, and these were small scale, typically utilising single subject designs. It appears that adult or peer models were typically used for video-based interventions during this period, as the search mostly located peer or adult modelled VM studies more than other VM types (Shukla-Mehta et a., 2010). The review also revealed that previous studies included maintenance evaluations but did not include generalisation and social validity measures.

Current Review. The current search located 13 studies that employed VSM intervention focusing on the social communication skills of individuals with ASD between

2009 to 2019. These studies were likewise small scale and utilised single subject designs or case studies. There was a total number of 30 participants, who were mostly between 3 and 8 years. Two studies had adult participants between 29 and 32 years (Tsui & Rutherford, 2014; Davis, 2019), and another study mentioned three participants in the 6th and 8th grades, between 11 and 14 years (Williamson et al., 2013). These studies were usually conducted in the school setting, with only two studies done in the home setting (Litras, Moore & Anderson, 2010; Lee, Lo & Lo, 2017) and one in the workplace (Davis, 2019). Eight of the 13 studies utilised VSM as the primary intervention, while five studies employed VSM with other accompanying interventions, such as social story, text and voice-over with verbal prompting (Litras, et al., 2010), video feedback (i.e. verbal narration and praise on individual's video performance upon video replay; Kabashi & Kaczmarek, 2017; Kabashi & Epstein, 2017), as well as with behaviour skills training (BST; McFee, 2010; Davis, 2019).

Overall, results from nine studies generally indicate that VSM led to positive gains in social communication skills (Boudreau & Harvey, 2013; Buggey et al., 2011; Davis, 2019; Kabashi & Epstein, 2017; Kabashi & Kaczmarek, 2017; Lee et al., 2017; Litras et al., 2010; Lemmon & Green, 2015; McFee, 2010), with the remaining four studies reporting no effect from intervention (Andrade, 2018; Buggey, 2012; Tsui & Rutherford, 2014; Williamson et al., 2013). The investigation done by Andrade (2018) did not find any intervention effects on the three participants, which the author believes is likely due to component of target skills not comparable with the children's learning potentials. Likewise, Buggy (2012) and Buggey et al. (2011) found no changes in target behaviours for children 4 years and below, with positive gains noted on participants over 4 years old, while Tsui and Rutherford (2014) found minimised undesired behaviours in a 30-year-old man with ASD, with no significant changes in prosocial behaviours, although subjective data did support some positive change. Williamson et al. (2013) likewise found no behaviour changes in two of the three participants with relatively low cognitive, language and communication skills, while the one who did

show positive gains has reportedly had previous VSM experience. Furthermore, maintenance measures were observed in most studies, but generalisation and social validity evaluations were only observed in five (Kabashi & Epstein, 2017; Kabashi & Kaczmarek, 2017; Lee et al., 2017; Litras et al., 2010; McFee, 2010) and three studies (Kabashi & Epstein, 2017; Kabashi & Kaczmarek, 2017; Lemmon & Green, 2015), respectively. Based on the current review, there seems to be an apparent need for more VSM intervention studies focused on improving the social communication skills of children with ASD, in more diverse populations, age ranges, and settings (e.g. home environment), as well as in the use of VSM as the primary intervention, for the purpose of expanding on current literature, and in the evaluation of maintenance, generalisation and social validity aspects to further support the establishment of VSM intervention efficacy.

Critique. Existing empirical data on the positive applications of VSM interventions (Hitchcock, Dowrick & Prater, 2003) seem to demonstrate continued growth over the past decade, particularly in relation to social communication skills in individuals with ASD. Despite evidence for potential success of VSM intervention however, only 13 studies that fit the current review criteria were located over a recent ten-year period, with only eight of these carried out as primarily VSM (i.e. not combined with other intervention strategies). This information seems to indicate a slow pace of VSM intervention development, which according to Fey and Finestack (2011), could also indicate a lack of direction or incoherence between investigators, such that a systematic framework is needed to guide investigations.

Fey and Finestack (2011) thus, propose a five-phase framework for intervention evaluation in research, distinguishing *efficacy*, which involves intervention outcomes in ideal conditions, from *effectiveness*, which involves intervention outcomes in more real-life settings. *Pretrial studies*, the first phase of intervention development, are observational studies that provide theoretical basis for hypothesis development, and goal and procedural planning, providing the foundations for *feasibility* studies, the second phase of intervention

development that involves testing hypotheses for the purpose of evaluating viability rather than outcome. *Early efficacy* studies, the third phase of intervention development, are the first studies that determine efficacy of an intervention, which involves small scale, short-term, cause and effect comparative investigations of treatment and control variables, evolving into *late efficacy* studies, which builds on similar cause and effect comparisons, conducted in more functional and generalisable conditions. Finally, *effectiveness* studies which investigate outcomes of efficacious interventions under typical contexts with a broader scope, establishes the effectiveness of an intervention. The authors likewise stress the value that each stage contributes to intervention development in order to establish evidence of effectiveness, including the earlier efficacy stages, or the observational stages that provide low evidence levels for effectiveness.

Effective interventions are said to consider the population who will most benefit from them, such as individual characteristics including age, gender, level of cognitive functioning (Buggy, 2012), and family environment (Ooi, Ong, Jacob & Khan, 2016; Osborne, McHugh, Saunders & Reed, 2008); the inclusion of developmentally appropriate goals that emphasise learner prerequisite processes for successful imitation, modification, and acquisition of new behaviours (Dowrick, 2012); and considering intervention facilitator and context (Fey & Finestack, 2011) to reinforce learning within the child's natural environment, while establishing fidelity of implementation through realistic and measurable procedures and outcomes (Shukla-Mehta et al., 2010).

While studies over the past forty years were generally small-scale, short-term, and employed single subject designs (Buggey & Ogle, 2012), their significance are highlighted in terms of providing foundational outcomes that support more comprehensive clinical investigations on intervention effectiveness (Fey & Finestack, 2009). Additionally, it seemed apparent that studies on VSM for social communication in ASD over the past four decades, were limited in the variety of intervention facilitator and context, with the majority of studies

having been conducted in school or clinical settings (Buggey & Ogle, 2012), and the current ten-year review yielding only two studies conducted in the home setting. While VSM intervention has reportedly been successful with children who appreciate watching themselves on video and those who are able to attend to visual instruction (Shukla-Mehta et al., 2010), it was noted to be unsuccessful with children younger than 4 years (Buggey, 2005; Buggey et al., 2011), or those with severe cognitive functioning (Williamson et al., 2013), emphasising that individual differences do impact intervention outcomes. Furthermore, outcome measures such as social validity and generalisation were not consistently employed in previous and currently reviewed studies (Shukla-Mehta et al., 2010), which led to researchers suggesting further investigations to examine VSM efficacy and social validity (Bellini & Akullian, 2007). In relation to this, the MHE (2016) emphasises the need for an effective intervention for children with ASD that focuses on independence, self-advocacy in their core deficits (i.e. communication and social interaction), and that affects social change. Incorporating measures for social validity of intervention goals, procedures, and outcomes may help achieve this purpose. Maintenance and generalisation outcomes are likewise paramount to successful acquisition of skills, and the inclusion of these measures will support efficacy of VSM intervention (Fragale, 2014). Additionally, it is important to consider the difficulties with generalisation of learned skills in children with ASD (APA, 2013), which may be addressed by conducting intervention within typical daily routine. VSM studies have also often utilised concurrent intervention strategies in its application (Buggey & Ogle, 2012), and while literature has seen an increase in the exclusive use of VSM as an isolated intervention to target specific skills, in recent years, there is a need for further investigation of VSM applications as the primary strategy within the child's natural environment, to further examine its efficacy as a stand-alone intervention.

Based on Fey and Finestack's (2009) five-phase framework, the current evidence base observed in VSM literature appears to identify VSM interventions in the early efficacy phase

of development, which involves the cause and effect relationship between intervention and target outcomes in small-scale environments, and may well be on its way to later efficacy phase, particularly with the increase in VSM investigations done recently, attributed to technological advancements. However, before late efficacy and effectiveness studies can be conducted, there must be satisfactory data on early efficacy of VSM, thus establishing the need for more small-scale early efficacy studies on VSM interventions focusing on target-specific skills, such as social communication, in children with ASD, to expand its empirical literature base (Fey & Finestack, 2009; Fey, 2014).

Current Study: Rationale

Parents, caregivers, teachers, and professionals are often confronted with the challenge of deciding on and successfully implementing evidence-based interventions for individuals with ASD (MHE, 2016). Consequently, the rise in prevalence of ASD has led to the continuous search for effective interventions through clinical investigations (Damiano, Mazefsky, White, & Dichter, 2014). Government policies currently focus on inclusive practices for ASD learning differences that address its core deficits (MHE, 2016; Schmidt & Bonds-Raacke, 2013), advocating early recognition, identification and treatment for optimal outcomes in individuals and their families (Fein et al., 2013). Early efficacy studies are valued for the preliminary experimental evidence they provide in intervention development (Fey & Finestack, 2011). The implementation of an early efficacy study on VSM intervention for the social communication skills of children with ASD, will then add to its target existing literature and provide basis for more comprehensive investigations.

Individuals with ASD are noted to present difficulties with attention, shifting, imitation, the unusual preoccupation to irrelevant details in the environment, and the propensity for visual rather than auditory information. Video-based interventions such as VSM address these by restricting viewer focus to the viewing screen (Charlop-Christy, Le & Freeman, 2000) and to relevant components of target behaviour, reducing attentional, social

and language demands on learning that comes with face-to-face interventions (Bellini & Akullian, 2007). VSM is likewise attributed accelerated learning due to its preferred visual nature of presentation among children with ASD (Hodgedon, 2001) and its advanced representation of self-efficacy (Bellini & Akullian, 2007). Dowrick (2012) claims the feedforward mechanism of VSM makes this possible, relating recent neurocognitive studies on mirror neurons and learning from cognitive self-simulations of future events. Oberman et al. (2005) identify mirror neuron system dysfunction as it relates to language development, imitation learning, and theory of mind development, consequently held responsible for the social and communication deficits in ASD. Ramachandran and Oberman (2006) pose that mirror neuron function in ASD can be trained and strengthened through the process of VSM. Furthermore, Uddin et al.'s (2008) neuroimaging study on self-face recognition revealed preferential response to self- more than other-representations in individuals with ASD, thus considering VSM more motivating and interesting for children with ASD.

In an effort to provide alternative evidence-based interventions to parents who are predisposed to higher levels of stress related to caring for a child with ASD (Ingersoll & Hambrick, 2011), VSM is likewise said to be easier and less costly to develop and reproduce, is consistent, and enables the recreation of different settings that are otherwise difficult to recreate in live interventions (Charlop-Christy, Le, & Freeman, 2000; Schmidt & Bonds-Raacke, 2013). Social deficits in individuals with ASD further highlight difficulties with generalisation and coping with changes in their environment (APA, 2013). Thus, the implementation of VSM intervention as part of the children's routine at home, utilising usual items or materials found around them, and including parents in the intervention process may support to lessen the anxiety associated with social learning (Corbett et al., 2012) and provide a more suitable measure for the efficacy of VSM intervention. Measuring maintenance, generalization and social validity of the intervention likewise support the viability of VSM efficacy (Bellini & Akullian, 2007).

Aims and Hypotheses

The purpose of this study was to document the efficacy of VSM, in the acquisition, maintenance and generalisation of social communication skills of children with ASD in the home setting. This research aimed to focus on improving social communication skills of 5-10 year old children with ASD. Furthermore, the study aimed to supplement existing data from previous studies using VSM in teaching social communication skills to children with ASD (Litras, Moore & Anderson, 2010; Andrade, 2018; Kabashi & Kaczmarek, 2017; Sherer et. al., 2001, Buggey, Toombs, Gardener & Cervetti, 1999), and increase our understanding on the use of VSM in social communication and autism.

The aims and hypotheses of the study are specified as follows:

1. To investigate the effect of VSM intervention in the acquisition and maintenance of target social communication skills of 5-10 year old children with ASD in the home setting.

   Hypothesis: It is hypothesised that video self-modelling intervention will result to accelerated learning and maintenance of target social communication skills of children with ASD, in the home setting over time.

2. To determine whether acquisition of a new social communication skill consequently decreases the presentation of unwanted responses in specified contexts.

   Hypothesis: It is hypothesised that as the children's target skills increase, off-target responses decrease.

3. To assess whether treatment results to generalisation of skills and social validity of the intervention, as perceived by the children's parents.

   Hypothesis: It is hypothesised that the skills learnt from video self-modelling will generalise to other social communicative domains, and that parents will deem this a socially valid intervention they can replicate and apply.

Method

Design

This study utilised a single-subject multiple baseline design that consisted of baseline, intervention, short and long-term maintenance, and generalisation phases. The single-subject design, common in early efficacy studies (Fey & Finestack, 2009), was selected to accommodate individual differences, such as gender, age and ASD characteristics, and the children themselves served as their own control. It enabled comparison of performance between experimental and control conditions in individual participants across repeated observation of target behaviours (McReynolds & Thompson, 1986; Portney & Watkins, 2008). Replications are the main attributes of multiple baseline designs, and accordingly, this study involved three participants to ensure that replication of intervention outcome was observed in more than one child (McReynolds & Kearns, 1983; Portney & Watkins, 2008; Dallery, Cassidy & Raiff, 2013). Moreover, the application of a multiple baseline design was deemed appropriate in this study considering that intervention was expected to result in changes and learnings that will maintain and cannot return to baseline conditions (Morgan & Morgan, 2009). Initially, the intention was to begin participant baseline observations simultaneously and stagger introduction of treatment procedures, characteristic of concurrent multiple baseline designs. This was an attempt to control temporal influences and establish that treatment outcomes were due to the VSM intervention; However, this was not achieved due to differences in participant availability. Thus, a nonconcurrent multiple baseline design was instead utilised, where onset of baseline data collection varied for each child (Portney & Watkins, 2008).

The dependent variable was the performance of a new social communicative skill or improved performance of an existing social communicative skill. Target skills were different for each child as these were collaboratively determined with their parents, after the screening process was completed. Target skills identified for the three children were all verbal

utterances in response to stimulus question, statement, or presentation of highly desired or disliked item in social interactive contexts with their parents.

The independent variable was a 1-2-minute self-modelled video presented multiple times over 5 consecutive sessions on a mobile device, featuring each child engaging with a parent, in appropriate aspects of the target skill. Current research report that self-modelling interventions are most effective with 1-6 viewings of a 2-3 minute video, with said effects not influenced by the increase in number of viewing times (Shukla-Mehta, et al., 2009; Dowrick, 2012). The children watched their videos with the researcher at least once each session.

Ethics

This study was approved by the University of Canterbury Human Ethics Committee (HEC 2018/31 Amendment 1) upon registration of the thesis proposal. A copy of the approval of this study is provided in Appendix A.

Recruitment

From a list of disability and health service agencies, the researcher, in agreement with her supervisors, identified a suitable agency to contact for access to a service pool of clients to invite for participant recruitment. An email was sent to the agency, with attached information sheets for the organisation (see Appendix B), for the parents of participants, and for the children participants, which contained an explanation of study objectives, participant requirements, and contact details of the researcher and researchers' supervisors, in case of questions regarding the study (see Appendices C, D, E and F). Subsequently, the organisation passed on the provided cover letter and information sheets, embedded in an organisational letter, to potential families inviting them to initiate contact with the agency.

Following communication by interested parents/caregivers with the health agency, their contact information was passed on to the researcher, who then contacted the parent/caregiver by telephone for an initial screening procedure (see Appendix G). Based on information from the initial telephone screening, the researcher and her supervisor, then

proceeded to assess the details of potential participants and identify at least three children suitable for intervention that focused on improving social communication skills (e.g. requesting; responding to/initiating greeting; commenting; protesting; turn taking). After establishing each child's eligibility, the researcher proceeded to organise a home visit, where consent and assent were obtained (see Appendices H and I), and the Social Communication Questionnaire (SCQ) was conducted with the parents (see Appendix J).

Participants

Six parents initially responded to the invitation for participant recruitment; however, three potential participants withdrew just after consent was obtained and baseline observation was to begin. All recorded information about the potential participants who withdrew were destroyed and removed from the study. Three male children aged between 5 and 7 years (mean = 6.33 years; standard deviation = 1.15) participated in this study and were assigned pseudonyms to ensure their anonymity.

Inclusion criteria. Inclusion criteria for this study required children to be between 5-10 years old and reside in Whangarei, Northland, New Zealand. A formal diagnosis of ASD by a paediatrician, registered psychologist, psychiatrist, or specifically trained physician was essential requiring them to benefit from learning a new social communication skill (i.e. requesting, rejecting, greeting, responding, etc). The children must also be able to express in at least one-word utterances and attend to a two to three-minute video.

Exclusion criteria. Exclusion criteria included children who were unable to attend to a two to three-minute video, those whose parents/caregivers did not report difficulties in social communication skills and those who were not diagnosed with ASD by a paediatrician, psychologist, psychiatrist or specifically trained physician. Due to the likelihood of a variety of methods and measures utilized during diagnosis by different clinicians, the diagnostic methods used were recorded as needed, but did not form part

of the exclusion criteria. Table2 displays the children's pseudonyms and basic demographic information.

Table 2. *Children participant pseudonyms and demographic data.*

Name	Age (years)	Gender	Ethnicity	Diagnosis
Gian	7	Male	Tuvaluan	ASD[1]; developmental delay - type not specified
Kyle	7	Male	Tongan	ASD[1]
Ben	5	Male	NZ European	ASD[1] with language impairment

Note. 1: ASD = Autism Spectrum Disorder

Gian. Gian is the older of two siblings. He is verbal and has good vocabulary but does not always use his words in context. Gian's speech can also be unintelligible due to articulation difficulties. Gian's medical history is significant for breathing difficulty after immunisation at five months, when he subsequently underwent tracheal surgery and was on hospital ventilator for three months. He was fed by nasal tube until one year old and was only noted to start meeting developmental milestones since then. Gian was initially diagnosed with global developmental delay and received speech-language therapy and occupational therapy at day care. He received an ASD diagnosis at 5 years and 3 months from a clinical psychologist and was referred for ASD intervention, where the researcher worked with him and his family fortnightly for 6 months, a few months before participation in this study. He is currently on his first year of primary school and his special interests include numbers, computer games and watching YouTube videos. Gian has exceptional mental calculation skills that allow for quick computation of one's age and the specific day of one's birthdate by providing him with a person's complete date of birth. He also computes mathematical equations beyond age-appropriate levels and can talk about these interests for extended periods of time; However, Gian's parents are concerned that he is not able to carry out an ordinary conversation beyond single-turn interactions with them about other topics unless consistently prompted. Gian will not expand beyond single-word, phrase or sentence

responses to functional questions, such as, “what are you doing” or “what did you do at school?”. He will instead shift topics after one-utterance responses, walk away and ignore a direct question, or respond with noncontingent topics of interest, such as numbers. Gian’s parents identified these undesired responses for the study. These limitations are consistently reflected by Gian’s results on the SCQ where he obtained a score of 16, thus topic maintenance of up to three utterances was collaboratively identified as his target skill for the study. He was expected to respond contingently to the question “what are doing/what did you do,” and expand with two more utterances by commenting about the same topic.

Kyle. Kyle received an ASD diagnosis from a paediatrician at 4 years and 3 months via the Autism Diagnostic Observation Schedule (ADOS) Module 1. He has a few single-word utterances and some rote phrases with non-directed vocalisations. Kyle communicates predominantly through gestures, and his communication repertoire is primarily focused around obtaining wants and needs or rejecting undesired items. He is currently learning to use the Core Board through a speech-language therapy referral. Imitation of some functional words, such as “no” and “hungry”, can be facilitated when presented in the song “When You’re Happy and You Know It” (e.g. “When you’re happy and you know it, say NO”); However, Kyle seldom initiates the use of these words spontaneously in context. Kyle’s mother was involved in an ASD parent training programme, where the researcher was able to work with her for a few weeks, three months prior to Kyle’s participation in the study. Kyle obtained a score of 22 in the SCQ, and his mother emphasised Kyle’s inconsistent ability to respond to yes-no questions when asked “Do you want (food item)?”. When Kyle does not get understood, he gets upset and becomes aggressive. He will grab desired items, especially food, and will often cry, scream or hit his head with his fist when his communication attempts are not understood or when he is given the wrong item. These undesired responses were identified for the study. Kyle is reportedly able to express “no” verbally or by shaking his head when protesting, albeit inconsistently, but his mother also wants him to be able to

express “yes” to affirm when he does want something offered to him instead of grabbing. For this reason, responding to yes-no questions relating to desired or undesired items, was collaboratively chosen as Kyle’s target skill for the study, specifically to affirm with a “yes” utterance when he does want something offered to him.

Ben. Ben is younger of two siblings from a bilingual family, born to parents of Hungarian-South African and Argentinian ancestry. He received his ASD diagnosis from a clinical psychologist at 3 years and 5 months, where he was noted to present slight delays in gross motor skills and significant delays in receptive and expressive language, as well as social communication skills. An auditory assessment revealed adequate hearing for speech. English is the predominant language at home, but Ben also understands some basic Spanish words his mother often uses with him, such as “dale” for “hurry”. Ben had speech-language therapy and occupational therapy assessments at 2 years old and received intervention for one year. He was also referred for behaviour support to decrease challenging behaviours related to ASD. The researcher previously worked with Ben through this referral, fortnightly for 5 months, and rapport has been established six months prior to Ben participating in this study. Ben scored 17 in the SCQ. He currently communicates through verbal means using simple sentences with some misarticulations and can sustain conversational interactions for two to three turns; However, his parents report that Ben exhibits screaming and inappropriate exaggerated behaviours such as throwing or pushing, when protesting or expressing rejection, consequently identified as undesired responses for the study. The target skill collaboratively chosen for Ben was to politely protest/reject with “No, thank you”, when offered something he dislikes.

Setting

The study was conducted in each child’s family home. The SCQ, all video presentations and video recordings for baseline, intervention, short-term maintenance, long-term maintenance, and generalisation conditions were conducted in the same setting at

prearranged times. Adult-child interactions were designated in specific locations in each of the children's homes as depicted in their videos, such as the dining area and family room to allow for more natural parent-child interaction opportunities necessary to elicit target skills.

Materials and Equipment

Videos were taken using the Samsung Galaxy S5 smartphone video recorder, on a mobile device case with stand. Subsequently, videos taken for the VSM were edited using the free KineMaster for Android offline video editor software program on the same device, to remove observable prompts and produce a video sequence of each child interacting with the parent and performing the target behaviour correctly. The filming sessions utilised random materials identified by the parents as each of their child's highly preferred or least preferred items. These included food, books and toys that were usually present within the child's natural environment. The participants' videos were uploaded into individual USB flash drives and they were able to watch them either from their own devices, or direct from the Samsung Galaxy S5 smartphone device during each intervention session.

Measures

The Social Communication Questionnaire (SCQ) - Current Form (Rutter, Bailey & Lord, 2003) was used to collect information about the children's current skills and difficulties, which were then used to guide the specific video self-modelling intervention. Previously known as the Autism Screening Questionnaire, the SCQ is a valid, concise, easily administered and cost-effective screening measure based on the Autism Diagnostic Interview - Revised (ADI-R), a more comprehensive autism diagnostic instrument (Berument, Rutter, Pickles & Bailey, 1999; Marvin, Marvin, Lipkin & Law, 2017). Research outcomes from a meta-analysis of the utility of the SCQ as a screening instrument for ASD by Chesnut, Wei, Barnard-Brak and Richman (2017) verifies its validity by examining clinician preferences for autism-specific initial screening tools over the last 15 years. These results proved the SCQ a satisfactory and adequate ASD screening measure with a reliability coefficient of 0.885

(Rutter et al., 2003; Chesnut et. al., 2017; Moody et al., 2017). Validity and reliability studies on the SCQ also obtained strong sensitivity and specificity (.93 and .93 respectively for verbal children; .91 and .81 respectively for nonverbal children) for differentiating between children with and without ASD (Marvin et al., 2017; Chandler et al., 2007).

As one of the most extensively used and investigated ASD screening tools (Chesnut et al., 2017; Marvin et al., 2017), the SCQ helps determine the need for a more comprehensive autism evaluation. It highlights behaviours that are not commonly observed in neurotypical populations, and is recommended for children over the age of 4 and intellectually functioning within the age of at least 2 years. A cut-off score of >15 is proven to positively suggest the likelihood of autism (Rutter et al., 2003; Berument et al., 1999), although it has been mentioned that varied populations and objectives warrant different cut-off thresholds (Eaves, Wingert, Ho & Mickelson, 2006; Allen, Silove, Williams & Hutchins, 2007; Marvin, et al., 2017). The SCQ has two versions, the Lifetime Form and the Current Form. Both versions are 40-item principal caregiver rated yes-no feedback forms, but their difference lie in the focus of item questions. The Lifetime Form focuses on complete child developmental history, and the Current Form focuses on child behaviours from the past three months (Rutter et al., 2003). The use of evidence-based screening tools identifies not only difficulties but also strengths in social communication and emphasises competencies that support treatment planning for individuals with autism (Elleseff, 2016).

Researcher-made Observation Forms (see Appendix K) were used to gather information regarding performance of target skill and non-occurrence of target skill including undesired responses from each child, using frequency count. These Observation Forms were used to record data across all phases of the study. Verbal and nonverbal stimuli, target skill, and undesired responses as part of non-occurrence of target skill, were specified on each form. The Observation Forms introduced two response options, yes or no, to indicate whether the child was observed to perform the target response, undesired response or non-occurrence

of both, against ten opportunities to respond to stimuli for each study phase. The total frequency of target responses from the total number of presentations was calculated for each study phase. From the number of non-occurrence of target skills, the frequency of undesired responses was likewise calculated for each study phase.

The same observation forms were used to validate the inter-rater reliability of the repeated measure. This has implications for the validity of study outcomes. To establish inter-rater reliability, three qualified speech-language therapists randomly assigned to each child, were tasked to independently observe each of their assigned child's video recordings and score the number of target and non-target responses noted within the observation time. Non-target responses were also identified as either undesired responses or not. The total number of target responses and undesired responses were then recorded separately on the same forms and tallied with the researcher's own observation records. In reviewing the reliability scores, 80% was selected as the predetermined criterion for acceptable levels of agreement.

After the last second maintenance session, a follow up questionnaire (see Appendix L) was handed out to the parents with a postage paid return envelope. Parents were asked to briefly complete the researcher-made 10-item questionnaire to be handed back or posted back to the researcher. The first 7 items of the questionnaire utilised a 5-point Likert rating scale to measure social validity, and the last 3 items used a nominal yes/no rating scale to measure generalisation (Appendix L). The questionnaire, adapted from Buggey (2012), Buggey et al. (2011) and Kabashi and Epstein (2017), helped determine if the parents considered VSM a socially acceptable and viable intervention to utilise and develop at home, and helped determine if the new skills generalised into other situations, settings, or persons.

Procedure

After establishing each child's eligibility, obtaining consent and assent, and conducting the SCQ with the parents, the researcher and parents referred to the results from the SCQ to collaboratively identify a possible target social communication skill for the

intervention. The information gathered were discussed with the researcher's supervisors and used to guide the specific VSM intervention for each child. Observation and video recording then commenced allocating 10-20 minutes of observation time each day. Allocations covered consecutive days for baseline condition, filming and video production, intervention, short-term maintenance and generalisation conditions, followed by long-term maintenance data collection six weeks after. The first 5 minutes of these sessions involved parents preparing the setting, discretely laying out food or toys within the child's vicinity, to make them accessible to the child.

Baseline. Baseline evaluations were conducted for three to five consecutive sessions, at five to fifteen minutes duration, the week before intervention. Originally, baseline data was to be recorded discreetly by the parents using a Samsung Galaxy S5 mobile device, while the researcher live-streamed the video remotely through built-in screen mirroring capability on another device. This was intended to minimise observer influence on baseline data (Eastvold, Belanger & Vanderploeg, 2012); However, due to the technical process being reasonably complex for the parents and difficulties connecting remotely with the live stream during the first recording attempt, it was agreed with the parents that all baseline data video recordings will be collected by the researcher on site. The researcher is a qualified Speech-Language Therapist who has worked with the children participants for a minimum of three months, at least six months prior to the study, and rapport was already established with the families. To minimise observer effect during home observation, the researcher positioned herself unobtrusively in another location (e.g. the family room) with good vantage point for real time observation of the parent-child interaction being filmed (Eastvold et al., 2012).

Baseline observation commenced as soon as parents were instructed to begin and ceased after five to fifteen minutes of interaction. Data was gathered using frequency recording of target skill occurrences within the specified period. Off-target responses were recorded as non-occurrences of target skills. While the children were not simultaneously

observed for baseline conditions, different baseline session lengths were randomly assigned to each child and continued until data was stable for at least 3 observations. To allow spontaneous elicitation of target skills, observation times were prearranged with the parents to capture authentic occasions that allowed opportunities for each child to display the target skills, where possible. For instance, organising observation sessions at meal times when the child was anticipated to be hungry, to elicit affirmation, or a "yes" response, to stimulus question "Would you like some Nutrigrain®?". Parents identified particular statements, questions, or preferred and disliked food, toys or items at home, deemed more likely to facilitate situations that determined the need for their child to learn the desired response or target skill. Tangible stimuli were often needed to be prepared by parents ahead of observation time to create more naturalistic situations, such as making sure there was Nutrigrain® available at home, or that spaghetti with tomato sauce was ready for the child, just before observation started.

Video Production. Video production immediately followed baseline data collection. Video clips of specific components of the target skill were pieced together to construct a complete sequence of a video model where the child is accurately and independently performing the target skill while interacting with the parent. Once target skills were determined collaboratively with the parents, specific verbal and nonverbal stimuli such as statements, questions or items deemed more likely to elicit the target skills were determined for video production. Target skills for the three children were all verbal responses to stimuli, presented in a socially communicative context with a parent. The child and parent served as primary models for the videos. To control for inferential and incidental learning, scripted or role-played scenarios were recorded in random order. Initial filming commenced with the parents while they were positioned in the designated location. Parents were first instructed to pretend their child were in front of and interacting with them, and then then were asked to present the identified verbal or nonverbal (e.g. item/object) stimulus for the ongoing video

recording. Separately, filming of the children was initiated as soon as they were given prompts to facilitate the random production of target utterances while in the same designated filming location. Among the three children, while Kyle and Ben were only facilitated to imitate production of target utterances during filming, Gian was given a written template or script to read during video production, as his target skill was topic maintenance. The script included a list of cue sentences regarding a particular topic, such as “It’s colour is red”, “It is small”, “It’s shape is a circle”, “It can roll”, and “I like playing with it”. Gian was prompted to randomly read the script while filming was going on.

The KineMaster offline video editing software application, thereafter, enabled trimming, layering, connecting, cropping, zooming and copying of these video clips to produce a finished video showing both parent and child interacting with each other as if they were actually filmed interacting with each other. Other features of the editing software utilised in video production were freezing frames, adjusting speed or motion, removing audio, rotating video, fast forward and rewind functions. Additionally, visible and audible prompts were edited out and scenes were zoomed in to eliminate unwanted distractions.

Intervention. Intervention phase occurred over five consecutive sessions, the week following baseline sessions and video production. The researcher sat with each child to view their self-modelled videos, at least once every session, at predetermined times, consistently in the same location where target skill practice activity was to be done. The time, date, number of times the children watched their videos and their reactions to the videos were recorded on the observation sheets. Intervention sessions were video recorded and data collection began immediately after video viewing. Each child was presented with ten opportunities to perform target responses with their parent, as seen in the video, in a five to fifteen-minute activity after video viewing.

For Gian, the materials used included ordinary toys that he likes to play with such as his toy train, Lego blocks, coloured slime, marbles, a spinner, a pen and paper for drawing,

and his favourite books. While Gian was engaged in free play, his parent used one of the specific stimuli questions/statement (i.e. “What are you doing?”, “What’s that?”, “Tell me about it” or “Tell me more”). The use of fillers such as “uh-huh” or “okay” were utilised to acknowledge that the Gian was heard. A pause of approximately five seconds was provided whenever Gian would stop talking, before his parent presented the stimuli again.

For Kyle, materials used were food items such as his favourite chips, biscuits, cookies, gummy and chocolate candies. His parent presented the food item with the stimuli question “Would you like some ___?”, and gave the item to Kyle when he responded with “Yes”. The presentation was repeated after approximately five seconds when Kyle did not respond or when he tried to grab the item. The next opportunity was presented again after Kyle has finished eating his food item.

For Ben, materials used were food items he disliked such as his mother’s spaghetti with tomato sauce, a variety of nuts, seeds, and vegetables, as well as food he liked such as popcorn, tinned spaghetti and bag of crisps. Ben’s parent initially presented the food item with or without the stimuli question “Do you want some __?” or “How about __?” and waited for Ben to respond with “No, thank you”. The stimuli question was then presented again after a five-minute pause if Ben did not respond. Ben was intermittently presented with food items he liked as well, since intervention time coincided with Ben’s meal or tea time, for more functional interactions. Filming was ceased when child distress was noted, or aggressive behaviours were exhibited by each child.

Maintenance. The succeeding phase involved data collection for two maintenance phases. Short term maintenance phase (Maintenance 1) occurred over three consecutive sessions the week after intervention, while long term maintenance phase (Maintenance 2) occurred over three consecutive sessions six weeks after generalisation phase. Maintenance sessions were video recorded and data collection conditions for the two maintenance phases were similar to baseline, which did not include video viewing. During both maintenance

phases, sessions immediately started with the implementation of five to fifteen-minute target skill practice activities, where each child was presented with ten opportunities to perform target responses with their parent, utilising the same materials. Sessions for both phases were video recorded and data was documented on the observation sheets.

Generalisation. Following the first maintenance phase, generalisation data was collected over three consecutive sessions. This time, the children were observed as they interacted with people other than their parents and utilised stimuli items other than those used during the previous three phases of the study. This was intended to determine the generalisation of skills across people and stimuli. Generalisation sessions likewise immediately began with the implementation of target skill activities, presenting ten opportunities for each child with either an adult or peer. Similar to baseline, generalisation sessions were video recorded and data collection conditions did not include video viewing.

Social Validity. Upon conclusion of the study after the second maintenance phase, parents were asked to complete a short researcher-made follow-up parent questionnaire that assessed generalisation and social validity of the VSM intervention. A postage paid return envelope was included with the questionnaire to give the option of posting them back to the researcher if parents were unable to hand them back straight away. Parent responses from the generalisation items in the questionnaire were recorded to supplement observation data collected from the generalisation phase. When data was received back by the researcher, each child participant was presented with a $20 gift voucher to acknowledge their participation in the study.

Reliability

All sessions were video recorded to reinforce accuracy of data observation, procedural validity and treatment fidelity. The observation sheets provided specific cue questions or utterances from parents, and specific target responses from each child, to ensure treatment was administered and recorded as proposed. Three qualified speech-language therapists

served as reliability observers. They were each randomly assigned to a child participant, contingent to the onset of study implementation for each child. Inter-rater reliability was collected for approximately 30% of data from baseline, intervention, generalisation and the two maintenance phases, using the same observation forms. The reliability observers were initially familiarised with operational definitions, examples and non-examples of target responses and off-target responses, and respective verbal and nonverbal stimuli for each child. They then viewed randomly selected session videos from each study phase and scored them independently. Point-by-point agreement method was used for inter-rater reliability and was calculated by dividing the number of agreements by the total number of agreements and disagreements, multiplied by 100% (Gast & Ledford, 2014). An agreement of 80% was determined to indicate good inter-rater reliability (McHugh, 2012; Gast & Ledford, 2014).

Table 3 displays a summary of inter-rater reliability totals of target responses for each child across different phases of the study. Inter-rater reliability ranged from 83.33% to 100% for all the children across phases. Inter-rater agreement for Gian was 95.42% with a range from 83.33% to 100%, 94.64% for Kyle with a range from 85.71% to 100%, and 96.67% for Ben with a range from 83.33% to 100%. An over-all inter-rater agreement total of 95.58% was calculated with a range of 83.33% to 100%. These figures are all considered within acceptable range (McHugh, 2012).

Table 3. *Inter-rater reliability totals for target responses across study phases (%).*

	Baseline	Intervention	Maintenance 1	Generalisation	Maintenance 2
Gian	100	93.75	100	83.33	100
Kyle	100	100	100	85.71	87.50
Ben	100	83.33	100	100	100

Inter-rater agreement for undesired responses obtained from the total observations of non-occurrence of target skills was also calculated. The frequency ratio method was utilised to calculate agreement between observers for the number of undesired responses across all

phases of the study, by dividing the smaller total by the larger total, multiplied by 100 (Kazdin, 2011; Gast & Ledford, 2014). Table 4 displays a summary of inter-rater reliability totals of undesired responses for each child across different phases of the study. An overall inter-rater agreement total of 98.15% was calculated with a range of 83.33% to 100%. Inter-rater agreement for Gian was 100%, 94.44% for Kyle, with a range of 83.33% to 100%, and 100% for Ben.

Table 4. *Inter-rater reliability totals for undesired responses across study phases (%).*

	Baseline	Intervention	Maintenance 1	Generalisation	Maintenance 2
Gian	100	100	100	100	100
Kyle	83.33	88.89	100	100	100
Ben	100	100	100	100	100

Data Analysis

Observation data was analysed visually in table forms and graphic representations to determine the effect of VSM intervention on social communication skill acquisition. The total frequency of target responses was computed for each session across phases and illustrated for visual inspection. The average level was also calculated, and range of level analysed to evaluate changes in the variability, level and trend of each child's baseline data against their intervention, two maintenance phase data and generalisation data. The latency to change (Nock, Michel & Photos, 2007, p.346) from each child's baseline data to intervention data was likewise examined to test the study's hypothesis of accelerated learning attributed to VSM. Furthermore, the percentage of data points exceeding median (PEM) of baseline level was applied to measure intervention effect sizes. The PEM method was preferred over other effect size measures because it accommodates for the presence of 0 or 100 (ceiling or floor effect) baseline values (Ma, 2006), which was the case for this study. Ma (2006) proposes, to calculate the PEM for studies that aim to measure increases in behaviours, the percentage of intervention data points above the median value of baseline level is computed. The

recommended criteria for effect size measurement considered values below 50% as ineffective, between 50% and 70% as mildly effective, between 71% and 90% as moderately effective, and values between 91% and 100% as very effective intervention (Ma, 2006; Sen & Sen, 2019).

The number of off-target responses during each session were also recorded for all children, as part of their non-occurrence of target responses. The number of off-target responses were totalled for each phase, and the sum divided by the number of sessions for each phase. This produced a mean number of undesired responses for each phase of the study.

Results

VSM Intervention Effect on Target Social Communication Skills

This study examined the effect of VSM intervention on the social communication skills of children with ASD. Visual inspection of data revealed that all children gained significant improvements in target social communication skills, indicating the effectiveness of video self-modelling as an intervention method. The direct replication of positive effects across three children further supports the success of treatment.

Figure 1 displays a summary of the frequency of target responses for each child across all phases of the study.

Subsequently, the mean frequency and range of target responses for each child across all phases in the study is presented in Table 5, indicating the mean number of VSM video viewing times for each child during intervention. The number of video viewings did not seem to have any apparent influence on the results of VSM intervention for each child.

Figure 1. *Frequency of children's target social communication skills across study phases.*

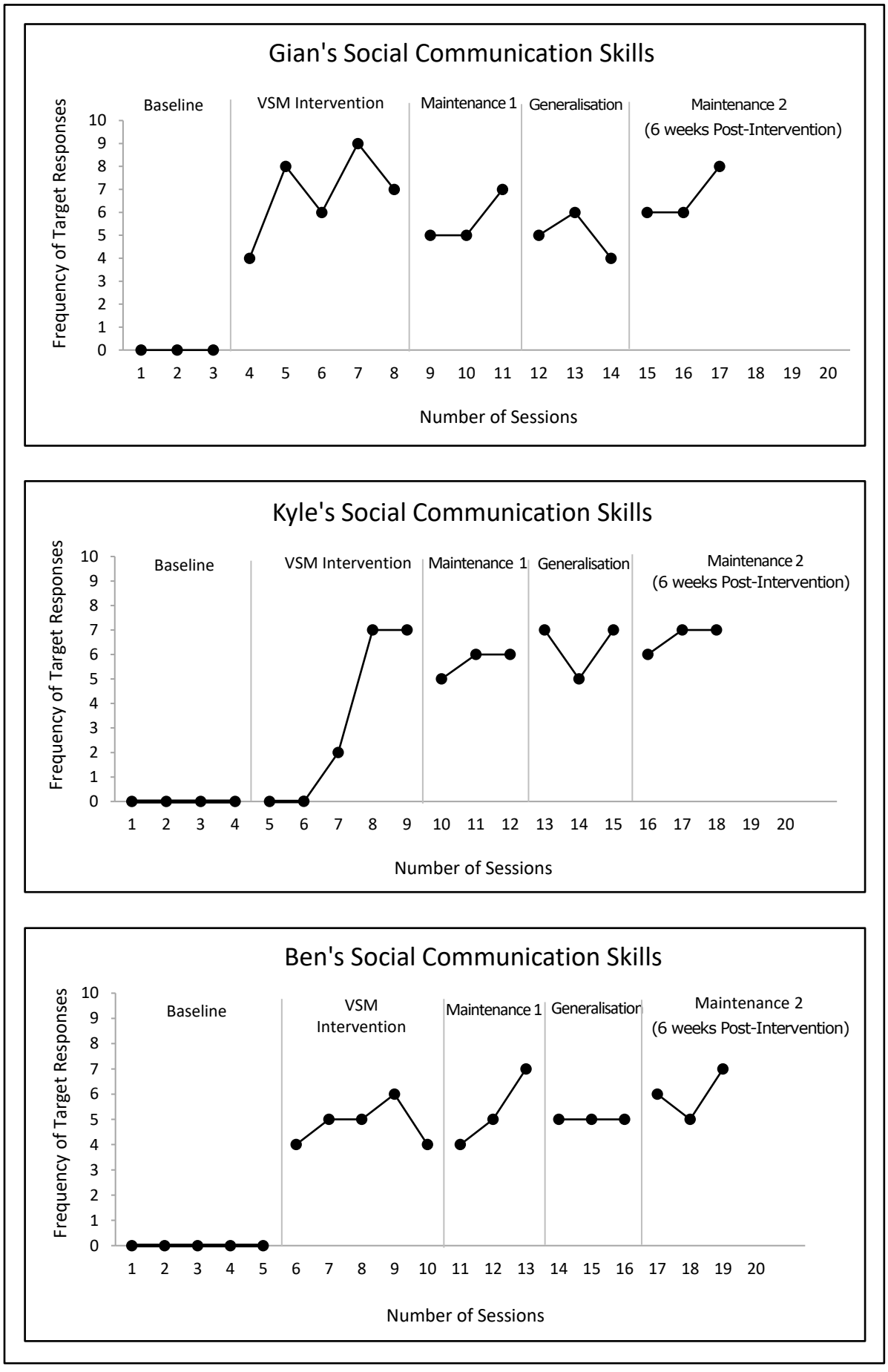


Table 5. *Mean frequency and range of target responses for each child across study phases.*

	Baseline	Intervention	Maintenance 1	Generalisation	Maintenance 2	Number of Video Views
Gian	**0** r = 0	**6.80** r = 4-9	**5.67** r = 5-7	**5** r = 4-6	**6.67** r = 6-8	5
Kyle	**0** r = 0	**3.20** r = 0-7	**5.67** r = 5-6	**6.33** r = 5-7	**6.67** r = 6-7	10
Ben	**0** r = 0	**4.80** r = 4-6	**5.33** r = 4-7	**5** r = 5	**6** r = 5-7	3

Note: r = range

Experimental outcomes regarding VSM intervention effect on target social communication skill acquisition and maintenance are discussed for each child across the different phases of the study.

Gian. As illustrated in Figure 1, Gian's data was stable at 0 level for all three baseline sessions. He did not make additional comments following initial responses to stimuli questions. Instead, after single-utterance contingent responses, he promptly shifted to his topics of interest, usually numbers, and talked continuously about them almost by rote, such as "What is three times four? It's twelve, and three times five is fifteen, etc." or "The even numbers are two, four, six, etc.". Upon introduction of VSM intervention, rapid skill acquisition was immediately observed during the first intervention session and was maintained through all other sessions. This demonstrated a short latency to change from baseline to intervention, suggesting a strong treatment effect.

Although Gian's intervention data was slightly variable and displayed an ascending trendline that descended slightly, there was an obvious change in the level and trend from baseline to intervention. Gian's average rate of performance increased to 6.80 from 0 level at baseline, ranging from 4 to 9 target responses per session, and skill acquisition of 6.80, as presented in Table 5. Gian's data for the two maintenance phases, one week after intervention and six weeks after generalisation respectively, both displayed stable ascending trendlines, although at slightly different levels. Gian's performance slightly decreased in maintenance 1 to an average of 5.67 with a range of 5 to 7 target responses, and slightly increased again at

maintenance 2 to an average of 6.67 with a range of 6 to 8 target responses per session. Both data showed that target skills gained from intervention were generally maintained. Gian's data indicated a PEM score of 100% from baseline across all other phases of the study, strongly suggesting a high magnitude of treatment effect, implying that VSM intervention was very effective for Gian.

Kyle. Figure 1 also presents Kyle's baseline data to be stable at 0 level. Kyle did not respond "yes" to cue questions or when offered highly desired food items, instead, he either snatched, grabbed, yelled or cried, which were recorded both as non-occurrence of target responses and off-target responses. With the introduction of VSM intervention, there was an observable change in level and trend of Kyle's data from 0 level at baseline to an average performance of 3.20, with a range of 0 to 7 target responses per session. Kyle's first two intervention sessions appeared to have maintained from baseline at 0 level showing skill acquisition on the third intervention session. Kyle's skill acquisition, which averaged to 3.20, indicated a two-session latency to change. Upon skill acquisition, Kyle's data displayed an ascending trendline that was maintained throughout the duration of the study suggesting an increased mastery of target responses.

Kyle's performance at maintenance 1, the week after intervention, increased in level from intervention phase to an average of 5.67 with a range of 5 to 6 target responses per session, and further increased at maintenance 2, six weeks after generalisation, to an average of 6.67 with a range of 6 to 7 target responses per session, suggesting that skills gained were maintained. PEM statistics was obtained consisting all of Kyle's data points across the different phases of the study, including maintenance and generalisation, for a more accurate gauge of treatment efficacy (Preston & Carter, 2009). The longer latency to change depicted in Kyle's data produced a low median score during intervention despite a relatively high range of target responses. This likewise impacted on his PEM score of 85.71%, suggesting that VSM intervention was moderately effective for Kyle (Ma, 2006; Sen & Sen, 2019).

While PEM approach can be used to quantitatively complement results from visual inspection, Kyle's PEM score did not seem to capture his mastery of target skill and the magnitude of overall intervention effect, an identified weakness of PEM statistics (Ma, 2006).

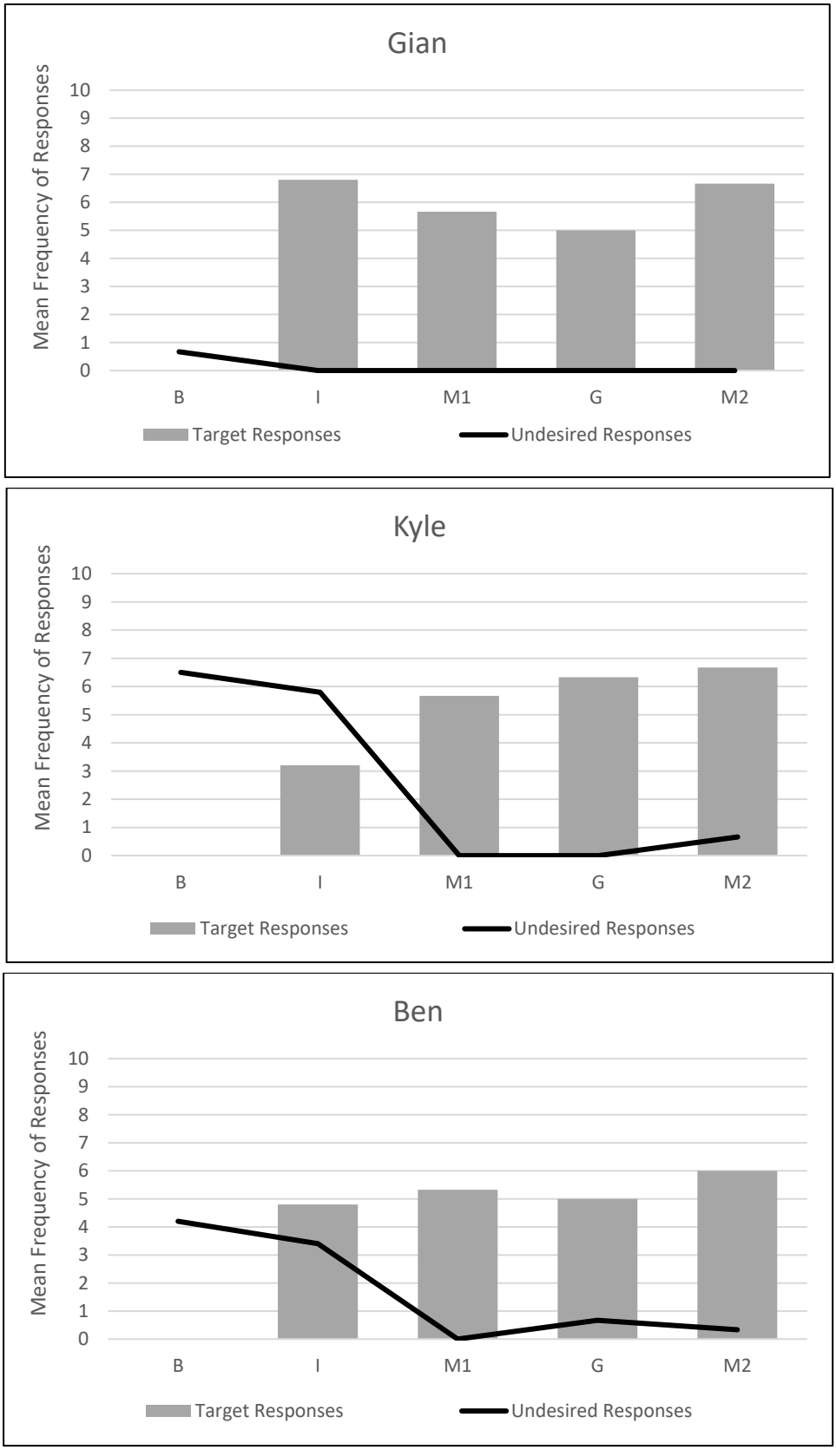
Ben. Ben's baseline data was stable at the 0 level for all sessions as presented in Figure 1. He showed inappropriate behaviours to express rejection or protest of highly undesired food items offered, which were recorded as part of non-occurrence of target skills. A change in level was immediately observed on the first session following VSM intervention, suggesting a short latency to change.

Ben's intervention data presented with an ascending trendline that descended slightly on the last session. His average performance during intervention phase was 4.80 with a range of 4 to 6 target responses per session, and a skill acquisition of 4.80. Ben's average performance for the two maintenance phases were, 5.33 for maintenance 1 (one week after intervention) with a range of 4 to 7 target responses per session, and 6 for maintenance 2 (six weeks after generalisation) with a range of 5 to 7 target responses per session. Both maintenance data had ascending trendlines with minimal variability during maintenance 2. This suggests that target skills acquired were maintained after intervention. Ben's PEM score was 100% demonstrating a high magnitude of treatment effect or large effect size, further indicating that VSM intervention was very effective for Ben.

VSM Intervention Effect on Off-Target Responses

Throughout the duration of the study, the number of off-target responses were recorded as part of the non-occurrence of target skills. Figure 2 presents the mean number of each child's off-target responses relative to the mean frequency of target responses across all study phases.

Figure 2. *Mean frequency of target responses against mean number of off-target responses.*



Note: B=Baseline; I=Intervention; M1=Maintenance 1 at one week; G=Generalisation; M2=Maintenance 2 at six weeks

From the tally of non-occurrence of target skills, Gian was recorded to display 2 off-target responses during baseline and none throughout the duration of the study. This translated to an average of 0.67 off-target responses for baseline on his graph in Figure 2. As indicated, Gian's frequency of off-target responses decreased and maintained at 0 level, with the acquisition and increased application of target responses.

Kyle was noted to display a high average frequency of 6.50 off-target responses during baseline, which slightly decreased during intervention. His data showed a rapid decrease of off-target responses to 0 level during maintenance 1 and generalisation phases, with a very minimal increase noted after six weeks, during maintenance 2. Figure 2 further implies that Kyle's off-target responses essentially decreased as he learned to use his target responses.

Ben's average frequency of off-target responses during baseline phase was recorded at 4.20, which decreased consistently throughout intervention and maintenance 1 and 2, with a slight increase during generalisation phase. Similarly, a general decline in Ben's off-target responses was apparent following acquisition and application of target responses as indicated in Figure 2.

Generalisation

During generalisation phase, each child was presented with the same opportunities to practice target responses, by utilising different stimuli items and interacting with different people from the video, while the setting remained the same. Each child's performance during generalisation phase are discussed.

Gian's generalisation data was slightly variable with a slightly decreasing trendline. His average performance was 5 with a range of 4 to 6 target responses per session, indicating a lower average level than intervention and the two maintenance phases, but significantly higher than baseline. His data demonstrated that target skills gained were generalised with different people and different items. Similarly, Kyle's generalisation data was variable, but it

showed an increased in level from maintenance 1 to an average level of 6.33 with a range of 5 to 7 target responses per session. This suggests that target skills acquired have generalised to different people and different items. Moreover, Ben's generalisation data indicated an average level of 5 with a stable range of 5 target responses per session. His generalisation trendline was stable, and although it decreased slightly from maintenance 1, there was significant change in level from baseline, indicating that skills acquired have generalised to different people and different items.

Towards the end of the study, the parents answered three items about generalisation of target skills following intervention on the follow-up questionnaire. All the parents responded positively to generalisation of target skills to different situations (e.g. playing, walking about town, at a birthday party, watching YouTube videos), settings (e.g. at a friend's house, at school, at a fast food place), and people (e.g. with strangers, friends, teachers).

Overall, generalisation data from the two sources, visual information from Figure 1 and parent responses from the follow-up questionnaire, reflected that target skills gained by each of the three children have generalised to other situations, settings, stimuli and people.

Social Validity

In addition to the three generalisation questions, the follow-up questionnaire for parents also contained seven questions that assessed social validity using a Likert scale. Information was gathered regarding the parents' perceptions about relevance, implementation, effect on their children's target social communication skills, and the feasibility of utilising VSM intervention in the future. The parents all "strongly agreed" that each of their children's target social communication skills were important for children with ASD to learn, that VSM intervention was solely responsible for the new skills their children gained, that they would recommend VSM as an effective intervention method, and that they would consider creating similar videos for intervention in the future. Additionally, one parent "agreed" and two parents "strongly agreed" that their children gained adequate skills to improve on their target

skills, more confidence with their social communication skills by participating in the study, and that study implementation did not disrupt their children's daily routines. Overall, the parents' responses regarding relevance, implementation, effect and feasibility for future application of VSM intervention were optimistic.

Discussion

Summary

The primary aim of this study was to investigate the effect of VSM intervention on the social communication skills of children with ASD. Particularly, the study investigated whether VSM intervention appeared to result to accelerated learning and maintenance of target social communication responses for each of the child participants with ASD. The study included three male children between 5 and 7 years old, from varied backgrounds, ethnicity and levels of social communication functioning. The three children and their parents participated throughout the study. Results of the current study suggested that implementation of VSM intervention led to the rapid acquisition and maintenance of target social communication skills across all three children participants. These findings are consistent with the outcomes of previous studies supporting the efficacy of VSM intervention in teaching social communication skills to children with ASD (Kabashi & Epstein, 2017; Wert & Neisworth, 2003; Shukla-Mehta, et al., 2009; Litras, et al., 2010; Buggey, 2005; Gelbar, et al., 2012; Sherer et al., 2001).

The study also examined off-target responses relative to the children's performance of target social communication skills. As anticipated, off-target responses were observed to decline as the children's performance of target responses improved. These outcomes were found to support results from various VSM studies where unwanted behaviours decreased relative to target social communication skill acquisition (Buggey 2005; Buggey, et al. 1999; Delano, 2007; Nikopoulos & Keenen, 2003; Tsui & Rutherford, 2014; Lemmon & Green, 2015).

Additionally, results gathered from this study showed that the three children participants exhibited generalisation of target skills across situations, settings, materials and people, likewise corresponding with the findings of similar VSM intervention studies (Boudreau & Harvey, 2013; Buggey et al.,2011; Davis, 2019; Kabashi & Kaczmarek, 2017; Kabashi & Epstein, 2017; Lee et al., 2017; Litras et al., 2010; Lemmon & Green, 2015; McFee, 2010). Moreover, as with prior VSM intervention studies, the current research determined parents' perceptions of VSM as a socially valid intervention they would recommend and consider utilising in the future (Kabashi & Epstein, 2017; Kabashi & Kaczmarek, 2017; Lemmon & Green, 2015).

In contrast to previous studies that found VSM intervention to have no effect due to target skills way beyond the children's learning potential (Andrade, 2018), children being younger than 4 years (Buggey 2012), or having low cognitive and functional skills (Williamson et al, 2013), the efficacy of VSM intervention in the current study may be attributed to selected target skills within the children's zone of proximal development, and child participants being over four years old, with some level of imitation skills, suggesting functional and cognitive skill levels compatible for the application of VSM intervention.

Research Design

Some distinct advantages of this study include, (1) its multiple baseline design that allowed for observation of baseline control conditions against treatment effect across children participants, (2) the single subject design which further enabled an individualised intervention and a more individual inspection of each child's performance, (3) the inclusion of short-term and long-term maintenance and generalisation conditions, (4) the strong interrater reliability on the repeated measure of target behaviours (5) incorporating parent perceptions on intervention applicability and feasibility, (6) incorporating parent perceptions on social validity, and (7) utilisation of familiar daily routines in the home environment increasing ecological validity . Efficacy of VSM intervention was explored using treatment gains

observed in the children's performance of target responses during the different study phases relative to baseline. The results from each child's performance relative to baseline, during treatment, upon withdrawal of treatment, during generalisation and during follow-up six weeks later, evidenced the greater likelihood that VSM intervention was responsible for these positive changes in the children's target social communication responses, than that they could be accounted for by alternative factors such as maturation. The replicated effect across the child participants further establishes that these positive changes are unlikely to have occurred by chance alone.

As an early efficacy study, the valuable contribution of this research expands on existing literature of similar single subject research designs that provide evidence to support the efficacy of VSM intervention on the social communication skills of children with ASD. Small scale studies such as this, provide preliminary experimental evidence that strengthen the efficacy of an intervention (Fey & Finestack, 2011). This study is anticipated to contribute to the robust collection of small-scale, single subject, early efficacy experiments on VSM intervention, that serve as the basis for facilitation of more comprehensive, later efficacy studies, and pave the way for larger-scale investigations on VSM intervention effectiveness.

Video Production

Shukla-Mehta et al. (2010) expressed a number of challenges in the process of producing self-modelled videos for intervention. Collecting videos of the target skill can take time as children's compliance must be considered (Bellini & Akullian, 2007; Sherer, et al., 2001) in role playing or imitation of target skills (Buggy et al., 1999; Delano, 2007). In addition, Buggey et al. (1999) imply the challenge of eliciting a target skill for VSM that is beyond the child's current abilities. In contrast, the process for VSM production observed in the current study was time-efficient, simple and straightforward. All the children participants were compliant, and imitation of target skills were easily facilitated in 1-2 filming sessions, rendering a likewise uncomplicated video editing process with the simple operation of the

KineMaster© video editing programme. The children's levels of functioning certainly contributed to the uncomplicated process of this study's video production, where some form of imitation and skill acquisition were present in all child participants, including the child who had a higher SCQ score. Furthermore, target skills identified for each child based on the SCQ were collaboratively selected with their parents ensuring that these were incrementally just above their current abilities (Schertz, Baker, Hurwitz & Benner, 2011). In the application of VSM intervention for children with ASD, it is therefore significant to consider individual differences such as age and level of functioning.

Efficacy of Video Self-Modelling Intervention

VSM intervention appeared to have positive effects for all children participants, particularly for Gian and Ben who were observed to exhibit rapid skill acquisition on their first intervention sessions. Both children obtained SCQ scores just above the cut-off suggesting that both Gian and Ben's ASD symptoms were less severe. Both children were verbal, appeared to have good rote memory, and both enjoyed making their own videos or watching themselves on videos at home. Gian and Ben both had the ability to respond to stimuli questions prior to the study, but generally exhibited off-target responses. Gian often shifted to his topics of interest after single utterance contingent responses, while Ben often resorted to aggressive ways of expressing "no" when protesting or rejecting. Gian's target social communication skill was topic maintenance or expanding utterances by commenting. During filming, Gian's reading ability was utilised by preparing scripted comments about the stimulus material that he read a few times for the video, which he then viewed after editing, at least once every intervention session. The process of repeated video viewing, which Gian seemed to enjoy, appeared to have provided a pattern of target responses for Gian to use on actual sessions, thereby facilitating rapid skill acquisition. Similarly, video viewing usually brought a smile to Ben's face, engaging him to actively participate in sessions. The process of repeatedly viewing his own video seemed motivating for Ben, potentially initiating the

immediate skill acquisition Ben demonstrated on the first intervention session.

In contrast, Kyle, the youngest of the three children participants, did not demonstrate any affirmative expression before VSM intervention, instead, he either grabbed, yelled or cried. Kyle's SCQ score was highest among the three children suggesting a higher severity of ASD. As opposed to Gian and Ben who enjoyed viewing their own videos, Kyle showed limited and inconsistent interest with video viewing, and he seemed unable to sustain focus. He often displayed either grabbing of the video device or needing frequent prompts to view his video. It was initially unclear whether grabbing was prompted upon seeing the device because he wanted to play with it or because he wanted to watch his self-modelled video. Kyle's interest was roused over time with prompting every few seconds, yielding increased focus, attention and motivation at video viewing, which Dowrick (2012) maintains to be essential aspects of a successful modelling process. This led to Kyle viewing his video the most times among the three children participants. Kyle's initially reduced motivation level appeared to account for his slight delay in skill acquisition. He was observed to laugh, smile, and show increased motivation for video viewing, the more he saw his own video.

Evidence suggests that VSM intervention is effective for children who enjoy watching themselves on videos (Buggey et al., 1999). In addition, the exceptional capacity for visual learning and rote memory in people with ASD (Buggey, 2005; Stevens & Bernier, 2013) allow for the remarkably rapid acquisition of sequential information and factual details as they relate to their topics of interest (Klin, 2006). Enhanced by the repeated viewing of their self-modelled videos, Kehle et al (2002) infers that the positive depiction of themselves successfully performing target skills is embedded into the children's memories, guiding their actual performances. Thus, as demonstrated in this study, the positive representation of each child performing target skills appropriately in their videos, reinforced skill acquisition by learning from a viewpoint of self-mastery, which according to Bandura (1997), supports the foundation of VSM intervention.

While changes with Kyle's target skills were observed on the third session, improvement in performance of target skills were consistent across all three children, and these changes were maintained across all subsequent phases of the study. It was important to note that materials used in the video and during sessions to facilitate responding with "yes" and "no, thank you" for Kyle and Ben, respectively, were identified as relatively desired and undesired items, which may have possibly served as indirect reinforcers. While with Gian, the stimuli items used for his video and sessions seemed unlikely to have provided opportunities for reinforcement, as the only gains he could have obtained from the activities were increased verbal output from himself and increased opportunities to respond to social questions from his parents. Given these circumstances, it was unclear whether the materials utilised in the videos and during sessions had any direct influence on intervention effects, and therefore warrant further investigation.

On one occasion during intervention, Ben struggled keeping on-task and exhibited more off-target responses, as demonstrated by the slight decline in target responses towards the last intervention session. Apparently, his last intervention session was marked by routine changes, when his father stayed home at a time and day he was typically not expected to. When the first maintenance phase was conducted succeeding his last intervention session, Ben quickly regained the increased frequency of target responses, which was further maintained after six weeks. Routines provide structure and predictability to many people with ASD, causing anxious behaviours to emerge when unexpected changes happen and can have negative consequences on learning and information processing (Klin, 2006). The children's parents perceived that current study implementation of VSM intervention did not disrupt their routines as sessions were integrated into the children's usual daily activities, proving to be another strong point in the study.

Another significant finding in the study that supported the efficacy of VSM intervention was the diminished frequency of off-target responses as target responses

improved across all children participants. The VSM videos allowed each child to view themselves ideally performing target responses without the inappropriate and unwanted behaviours that usually manifested in these situations. Viewing their videos undoubtedly presented the children with replacement skills for off-target responses without directly focusing on eliminating off-target responses. As the children learned to demonstrate target skills in response to specific situations, off-target behaviours associated with these circumstances inadvertently decreased. This expands on the evidence base that VSM intervention is likewise effective in modifying and/or reducing undesired and off-task behaviours (Gelbar, et al., 2012; Buggey, 2005; Coyle & Cole, 2004; Lang et al., 2009; Bellini & Akullian, 2007; Bellini et al., 2007; Buggey et al., 1999; Wert & Neisworth, 2003).

Maintenance and Generalisation

Similar to Kyle, both Gian and Ben demonstrated increased performance and retention of skills learned from intervention to the first and second maintenance sessions. During the first maintenance phase upon withdrawal of video stimulus, the setting, material and task presenter, as well as the researcher's presence remained constant. The collective manifestation of these constant stimuli associated to target skill acquisition may have supported the children's retention of the intervention process, extending intervention effects into the succeeding study phases in the absence of video viewing. Furthermore, when the second maintenance sessions were conducted, all the children seemed enthusiastic upon meeting the researcher again and rushed to position themselves at their exact locations during activity sessions, six weeks prior. The researcher's presence appeared to have prompted the children's recall of previous activities, more so enhanced by presentation of recognisable materials, potentially facilitating the increased production of target responses during the second maintenance sessions. People with ASD often tend to exhibit strengths in cued recall and associative learning, developing paired associations, such as between a stimulus and a response, often without necessarily understanding the relational context between them

(Priesler, 2008; Williams et al., 2007; Bhat, et al., 2013). Cued recall, associative pairing and rote memory are said to be often prompted by external stimuli (Stevens & Bernier, 2013), in this case, the researcher's presence, and possibly the materials used in sessions, which remained constant across most of the duration of the study.

Both Gian and Ben's results declined during generalisation from maintenance, although the level of change from baseline was still significant. This was most likely due to generalisation sessions involving novel items and task presenters that were different from their videos, and therefore, different from the video model they previously learnt from. The advantage of including a generalisation phase in the study minimised the children's predisposition to rely heavily on rote memory learning, extending skill acquisition to a level of independence. Thus, recognising the significance of considering generalisability of skill acquisition in the future selection of intervention options. The evidence of treatment success in the study could be attributed to the fundamental characteristic of VSM intervention that facilitates learning strengths associated with ASD, such as repetition, visual and rote memory learning, and associative pairing relating to social communicative activities.

Overall, results from the current study expanded on existing data regarding efficacy of VSM intervention for social communication skills in children with ASD. Evidence suggests that VSM intervention can result to accelerated learning that is maintained over time and is generalisable, with effects not particularly influenced by the frequency of video viewing times. The decrease in off-target responses was also attributed to VSM intervention effects relative to gains in target social communication skills. Likewise, there was strong support from parent participants regarding VSM as an intervention that is effective, relevant to the needs of children with ASD and is feasible for implementation in the home setting. Furthermore, considerations in the application of VSM intervention includes establishing the individual differences of each child with ASD, such as age, extent of focus and attention span, motivation, individual abilities, level of social communication functioning, and the specific

skills to be addressed by the intervention, which may account for differences in VSM intervention effects.

Implications

Findings from the current study indicate that VSM was successful at improving the social communication skills of the three children with ASD in the home setting. These results may have implications for families, parents and caregivers, especially following the recent diagnosis of a child with ASD, regarding an intervention option they can implement at home that is effective and utilises commonly available equipment, under the guidance of a trained professional, such as a speech-language therapist (SLT). There is not much literature available about the application of VSM intervention in the home environment as most studies are usually conducted in the school or clinical settings (Shukla-Mehta et al., 2010; Bellini & Akullian, 2007). The significance of study implementation in the home setting was directed by the guidelines for autism intervention practice. According to Schertz et al. (2011), intervention should involve the parents, occur in the child's natural environment, be guided by the child's motivation and interests, and should incrementally target goals just over the child's current skills or within the zone of proximal development.

Furthermore, VSM intervention in the current context was integrated into the children's daily routines and enabled them to increase appropriate verbal responses to questions, learn how to express affirmation, or improve in expressing protest or rejection, by watching videos that did not require much parental instruction. These outcomes also have significant implications to parents and caregivers of children with ASD, regarding an effective intervention that is sustainable and not time-consuming, allowing them to focus on other family responsibilities. Family dynamics of the children participants in this study may be considered representative of the typical family unit, where parents often face more than just the responsibility of caring for their children with ASD. The demands of family life such as caring for other children, work, financial needs and other personal responsibilities, all

contribute to caregiver or parental stress, making voluntary access to external supports for children with ASD challenging (Karp et al., 2018). Additionally, parents and caregivers from lower educational backgrounds and those with higher stress levels need the most support for a practical intervention method (Karp et al., 2018).

Likewise, study outcomes have valuable implications for time-constrained educators, clinicians and paraprofessionals who work with families and children with ASD, in search of an alternative strategy for home-based intervention that is effective and can be collaboratively implemented by parents and caregivers. Apart from family challenges, limited funding towards public services (Davison, 2019) make eligibility and access for necessary support services more difficult (WHO, 2018), requiring the need for an effective, home-based intervention.

The study also investigated the efficacy of VSM without the aid of supplementary strategies. Families, parents and caregivers of children with ASD with limited time, resources and abilities may assume that a complex integration process of different approaches is necessary for successful skill acquisition. Although some materials utilised in the study may have functioned as indirect reinforcers on two of the child participants, improvement in target skills were noted on all the three children, suggesting that VSM intervention was effective with or without supplementary strategies. Inferences from study results may therefore imply that treatment effects were largely due to viewing VSM videos.

With technological advancement in recent years, access to digital or electronic devices capable of producing and editing customised videos have considerably improved. As established with parents prior to initiating study implementation, the technology used in the study was typically available (Holst, 2019; Research New Zealand, 2015) and the digital operations and applications were simple to operate, especially to one who is familiar with the operation of smartphone features, inferring that video editing is accessible, cost-effective and can be simple to administer (Goodwyn, Hatton, Vannest & Ganz, 2013).

Study outcomes also revealed that efficacy of VSM extended to reduction of off-target behaviours relative to target social communication skill acquisition in this population of children with ASD. These further imply that inappropriate behaviours with social communicative functions may diminish with replacement skill gains from VSM intervention for children with varied abilities. Thus, with evidence of these positive effects, application of VSM intervention may afford families and children with ASD better interactions at home, more time for other responsibilities and activities, decreased parental and child stress, and overall support for better quality of life.

Implications to clinical research are highlighted in terms of the study's contribution to empirical literature regarding the positive outcomes of VSM intervention on the social communication skills of children with ASD, as a small-scale early efficacy investigation. This additional data may further reinforce the foundations of VSM intervention efficacy and serve as motivation for the development of larger-scale investigations on VSM that will broaden the extent of its application.

Limitations

While study results support the application of VSM intervention, a number of limitations warrant consideration when evaluating data and discussing implications. A common threat to validity of single-subject designs is the small sample size that limits generalisability, an inherent feature of early efficacy studies (Fey & Finestack, 2011). Due to time constraints and recruitment difficulties, only three children completed all phases of the study and they may be a limited representation of the intended study population. Further research using a larger sample size or more varied participant age range is recommended to supplement current study outcomes and support generalisability, common features of late efficacy and effectiveness investigations. Time restrictions also meant that length of study phases, specifically maintenance and generalisation phases, and time measure for the second maintenance phase (six weeks), were limited. Study outcomes, therefore demonstrate the

short-term efficacy of VSM intervention, and could be made stronger by evaluating data across longer time periods for each condition, and a long-term follow-up measure to establish the length of time that acquired skills are maintained.

Additionally, the utilisation of a nonconcurrent multiple baseline design, sometimes considered weaker than the standard multiple baseline design, may threaten validity of study results by the effect of external temporal factors on control conditions (Portney & Watkins, 2008). However, it should be acknowledged that target skills for all children in the study were not demonstrated by each child independently prior to intervention, as these were just beyond their current abilities or zone of proximal development, hence the zero scores on all baseline conditions, which could not have been influenced by differences in onset of baseline observations. Given these circumstances, inferences and assumptions must be interpreted in the context of the current study. Similarly, the statistical method used in calculating effect size, PEM, does not consider magnitude of data points above the median where the meaning of calculated scores may possibly be misconstrued (Ma, 2006).

While this study asserts the ecological validity of VSM intervention by integrating its implementation into the children's daily routine, it was not viable to control the experimental environment. Extraneous factors such as family members not part of the intervention process, were present most sessions, sometimes interacting with the child during data collection, which may have influenced the child's performance. However, given that intervention was incorporated into the child's natural environment, the ability to ignore interruptions and re-focus on task after disengagement should likewise be regarded as integral to the child's learning process. Furthermore, families of children who participated in the study may have voluntarily or involuntarily coached the children and facilitated target skills in between sessions, which may have influenced the children's target skill acquisition. The effects of these circumstances warrant further investigation in future studies.

Finally, while efforts were made to keep the researcher's presence discreet across all

sessions, this factor may have functioned as prompts for the children to engage in target skills and therefore needs to be considered as part of the intervention.

Future Research

Outcomes of the current study indicate the efficacy of VSM intervention in improving the social communication skills of children with ASD in the home setting. Although, sample size was small, its value is reflected on its contribution to literature on early efficacy VSM intervention studies for social communication skills of children with ASD. Future research that aim to expand on early efficacy investigations may utilise this method with people with ASD from more varied demographic backgrounds, ages, abilities and settings, while those that aim to provide a starting point for late efficacy investigations may utilise this method in more functional and generalisable contexts. Future research that will establish why VSM intervention works is warranted to pave the way towards viability of using VSM intervention with adolescents and with children younger than 4 years old. Further exploration of the application of VSM in different developmental areas of need, such as facilitating conversational initiations and interactions, will help establish the generalisability of this intervention method. Furthermore, a large-scale comparative study between VSM and other video-based interventions will clarify the relative strengths and applications of each of these interventions and support parents, caregivers, educators and clinicians with wider options for teaching individuals with ASD in different areas of development (Fey & Finestack, 2011). Finally, an investigation into parental training needs to be able to successfully intervene for their children without the support of an SLT, will empower parents and subsequently develop the relative efficacy of VSM intervention in the home setting. In the field of technology, the creation of an application template for video production to support even easier administration of VSM intervention may be investigated for better generalisability and accessibility of this method, and help further address the global need for support services for children with ASD.

Conclusion

The current study provides further support to the efficacy of feedforward VSM intervention in the acquisition, maintenance and generalisation of new social communication skills in children with ASD. The increased prevalence of ASD in recent times has led to the development of proactive interventions, such as VSM, that focus on accommodating learning differences, building on individual strengths, and promoting independence in individuals with ASD, thereby reinforcing the likelihood of positive outcomes and improved quality of life. The current study indicated all three children improved, maintained, and generalised target social communication skills, consequently decreasing off-target behaviours, thus supporting a growing body of research suggesting VSM is an efficacious method, both for skill acquisition and affecting positive behaviour change. Subsequently, the VSM intervention process proved applicable in the home context, indicating that this can be an option for professionals working collaboratively with parents, to increase learning opportunities of children within the bounds of ordinary daily routines, utilising ordinary items in the environment. As an early efficacy study, the need for systematic replications are necessary, particularly with more diverse populations, to support establishment of VSM efficacy, and warrant more robust investigations in larger contexts.

References

Abu-Akel, A. & Shamay-Tsoory, S. (2011). Neuroanatomical and neurochemical bases of theory of mind. *Neuropsychologia, 49*(11), 2971-84. Doi:10.1016/j.neuropsychologia.2011.07.012.

Adams, C. (2005). Social communication intervention for school-age children: Rationale and description. *Seminars in Speech and Language, 26*(3), 181-188. https://doi.org/10.1055/s-2005-917123

Adams, R. B., Albohn, D. N. & Kveraga, K. (2017). Social vision: applying a social-functional approach to face and expression perception. *Current Directions in Psychological Science, 26*(3), 243–248. Retrieved from https://doi.org/10.1177/0963721417706392.

Adams, R. B. & Nelson, J. A. (2016). Eye behavior and gaze. In H. C. Hwang, D. Matsumoto and M. G. Frank (Eds.). *APA handbook of nonverbal communication* (pp. 335-362), Washington, DC: American Psychological Association. Doi: 10.1037/14669-013.

Adamson, L. B., McArthur, D., Markov, Y., Dunbar, B., & Bakeman, R. (2001). Autism and joint attention: Young children's responses to maternal bids. *Applied Developmental Psychology, 22*(4), 439–453. Doi:10.1016/S0193-3973(01)00089-2.

Adolphs, R. (2002). Neural systems for recognizing emotion. *Current Opinion in Neurobiology, 12*, 169-177. Retrieved from https://doi.org/10.1016/S0959-4388(02)00301-X.

Adolphs, R., Sears, L. & Piven, J. (2001). Abnormal processing of social information from faces in autism. *Journal of Cognitive Neuroscience, 13*(2), 232-40. Retrieved from http://dx.doi.org/10.1162/089892901564289.

Ahlström, B. H> & Wentz, E. (2014). Difficulties in everyday life: young persons with attention-deficit/hyperactivity disorder and autism spectrum disorders perspectives. A chat-log analysis. *International Journal of Qualitative Studies on Health and Well-*

being, 9, 23376. Doi:10.3402/qhw.v9.23376

Alcantara, J. I., Weisblatt, E. J., Moore, B. C. J., & Bolton, P. F. (2004). Speech-in-noise perception in high functioning individuals with autism or Asperger's syndrome. *Journal of Child Psychology and Psychiatry, 45*(6), 1107-14. Retrieved from https://doi.org/10.1111/j.1469-7610.2004.t01-1-00303.x

Alduncin, N., Huffman, L. C., Feldman, H. M., & Loe, I. M. (2014). Executive function is associated with social competence in preschool-aged children born preterm or full term. *Early Human Development, 90*(6), 299–306. Doi:10.1016/j.earlhumdev.2014.02.011

Allen, C., Silove, N., Williams, K. & Hutchins, P. (2007). Validity of the social communication questionnaire in assessing risk of autism in preschool children with developmental problems. *Journal of Autism and Developmental Disorders, 37*(7), 1272-8. Retrieved from https://www.ncbi.nlm.nih.gov/pubmed/17080270

Allison, T., Puce, A. & McCarthy, G. (2000). Social perception. *Trends in Cognitive Science, 4*(7), 267-278. Doi:10.1016/S1364-6613(00)01501-1

Altschuler, M., Sideridis, G., Kala, S., Warshawsky, M., Gilbert, R., Caroll, D. …Faja, S. (2018). Measuring individual differences in cognitive, affective, and spontaneous theory of mind among school-aged children with autism spectrum disorder. *Journal of Autism and Developmental Disorders, 48*(11), 3945-3957. Doi:10.1007/s10803-018-3663-1.

Amberg, J. S. & Vause, D. J. (2010). What is language? In *American English: History, structure, and usage* (pp. 1-18). New York, NY: Cambridge University Press

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Arlington, VA: Author.

Andrade, B.K. (2018). *Using video self-modeling to increase social communication in children with autism spectrum disorder* (Doctoral dissertation, University of

Connecticut, Storrs, CT). Retrieved from https://opencommons.uconn.edu/dissertations/1724.

Andrew, O. (2018). The history and evolution of the smartphone: 1992-2018. *Text Request*. Retrieved from https://www.textrequest.com/blog/history-evolution-smartphone.

Antezana, L. Mosner, M. G., Troiani, V. & Yrys, B. E. (2016). Social-emotional inhibition of return in children with autism spectrum disorder versus typical development. *Journal of Autism and Developmental Disorders, 46*(4), 1236-46. Doi:10.1007/s10803-015-2661-9.

Anthony, L. G., Kenworthy, L., Yerys, B. E., Jankowski, K. F., James, J. D., Harms, M. B. … Wallace, G. L. (2013). Interests in high-functioning autism are more intense, interfering, and idiosyncratic, but not more circumscribed, than those in neurotypical development. *Developmental Psychopathology, 25*(3), 643-652. Retrieved from https://doi.org/10.1017/S0954579413000072

Apperly, I. (2011). *Mindreaders: The cognitive basis of "theory of mind"*. New York, NY: Psychology Press.

Archer, A. L. & Hughes, C. A. (2011). Exploring the foundations of explicit instructions. In *Explicit instruction: Effective and efficient teaching* (pp1-22). New York, NY: The Guilford Press.

Arioli, M., Crespi, C. & Canessa, N. (2018). Social cognition through the lens of cognitive and clinical neuroscience. *BioMed Research International, 2018,* Article ID 4283427. Retrieved from https://doi.org/10.1155/2018/4283427.

Austin, G., Groppe, K. & Elsner, B. (2014). The reciprocal relationship between executive function and theory of mind in middle childhood: a 1-year longitudinal perspective. *Frontiers in Psychology, 5,* 655. Doi:10.3389/fpsyg.2014.00655.

Autism New Zealand Inc. (2019). About autism. Retrieved from http://www.autismnz.org.nz/about_autism

Ayres K. M. & Langone, J. (2007). A comparison of video modeling perspectives for students with autism. *Journal of Special Education Technology, 22*(2), 15-30. Retrieved from https://doi.org/10.1177/016264340702200202.

Ayres, K. M., Travers, J., Shepley, S. B. & Cagliani, R. (2017). Video-based instruction for learners with autism. In J. B. Leaf (Ed.). *Handbook of Social Skills and Autism Spectrum Disorder: Assessment, Curricula, and Intervention*. Cham, Switzerland: Springer International Publishing AG. Doi:10.1007/978-3-319-62995-7.

Baio, J., Wiggins, L., Christensen D., Maenner, M., Daniels, J., Warren, Z, … Dowling, N. (2018). Prevalence of autism spectrum disorder among children aged 8 years - autism and developmental disabilities monitoring network, 11 sites, United States, 2014. *Morbidity and Mortality Weekly Report, 2018*(67), SS-6:1–23. Retrieved from http://dx.doi.org/10.15585/mmwr.ss6706a1External.

Baker-Ericzén, M. J., Brookman-Frazee, L. & Stahmer, A. (2005). Stress levels and adaptability in parents of toddlers with and without autism spectrum disorders. *Research and Practice for Persons with Severe Disabilities, 30*(4), 194-204. Retrieved from https://doi.org/10.2511/rpsd.30.4.194.

Ballan, M. (2012). Parental perspectives of communication about sexuality in families of children with autism spectrum disorders. *Journal of Autism and Developmental Disorders, 42*(5), 676-684. Retrieved from https://doi.org/10.1007/s10803-011-1293-y

Bandura, A. (1971). *Social learning theory*. New York, NY: General Learning Press.

Bandura, A. (1977). *Social learning theory*. Englewood Cliffs, NJ: Prentice Hall.

Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Englewood Cliffs, NJ: Prentice Hall.

Bandura, A. (1994). Self-efficacy. In V. S. Ramachaudran (Ed.), *Encyclopedia of human behavior* (Vol. 4, pp. 71-81). New York: Academic Press. (Reprinted in H. Friedman [Ed.], *Encyclopedia of mental health*. San Diego: Academic Press, 1998).

Bandura, A., Ross, D., & Ross, S. A. (1963). Vicarious reinforcement and imitative learning. *Journal of Abnormal and Social Psychology, 67*, 601-607.

Bar-On, R. Tranel, D., Denburg, N. L. & Bechara, A. (2003). Exploring the neurological substrate of emotional and social intelligence. *Brain, 126*(Pt 8), 1790-800. Doi:10.1093/brain/awg177

Baron-Cohen S. (1988). Social and pragmatic deficits in autism: Cognitive or affective? *Journal of Autism and Developmental Disorders, 18*(3), 379-402. Retrieved from https://www.researchgate.net/profile/Simon_Baron-Cohen/publication/20105802_Social_and_pragmatic_deficits_in_autism_Cognitive_or_affective/links/0deec5173ac63d3b8d000000.pdf

Baron-Cohen, S. (2011). *The science of evil: On empathy and the origins of cruelty*. New York, NY: Basic Books.

Baron-Cohen, S. & Cross, P. (1992). Reading the eyes: evidence for the role of perception in the development of a theory of mind. *Mind & Language, 7*, 1-2. Retrieved from https://doi.org/10.1111/j.1468-0017.1992.tb00203.x.

Baron-Cohen, S., Jolliffe, T., Mortimore, C. & Robertson, M. (2006). Another advanced test of theory of mind: Evidence from very high functioning adults with autism or Asperger syndrome. *Journal of Child Psychology and Psychiatry and Allied Disciplines, 38*(7), 813–822. Retrieved from https://doi.org/10.1111/j.1469-7610.1997.tb01599.x

Baron-Cohen, S., Leslie, A. & Frith, U. (1985). Does the autistic child have a "theory of mind"? *Cognition, 21*(1), 37-46. Retrieved from https://doi.org/10.1016/0010-0277(85)90022-8

Baron-Cohen, S., Ring, H. A., Bullmore, E. T., Wheelwright, S., Ashwin, C., Williams, S. C. R. (2000). The amygdala theory of autism. *Neuroscience and Biobehavioral Reviews, 24*(3), 355-364. Retrieved from https://doi.org/10.1016/S0149-7634(00)00011-7

Bauminger N. (2002). The facilitation of social-emotional understanding and social interaction in high-functioning children with autism: Intervention outcomes. *Journal of Autism and Developmental Disorders, 2002*(32), 283-298 Retrieved from http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.455.106&rep=rep1&type=pdf

Bechara, A. (2004). The role of emotion in decision-making: evidence from neurological patients with orbitofrontal damage. *Brain and Cognition, 55*(1), 30-40. Retrieved from https://doi.org/10.1016/j.bandc.2003.04.001

Bellini, S. & Akullian, J. (2007). A meta-analysis of video modeling and video self-modeling interventions for children with autism spectrum disorders. *Exceptional Children, 73*(3), 264-287

Bellini S., Akullian, J. & Hopf, A. (2007). Increasing social engagement in young children with autism spectrum disorders using video self-modeling. *School Psychology Review, 36*(1), 80-90. Retrieved from https://www.researchgate.net/publication/234755857_Increasing_Social_Engagement_in_Young_Children_with_Autism_Spectrum_Disorders_Using_Video_Self-Modeling

Bellini, S. & Peters, J. K. (2008). Social skills training for youth with autism spectrum disorders. *Child and Adolescent Psychiatric Clinics of North America, 17*(4), 857-73. Doi:10.1016/j.chc.2008.06.008.

Bellini, S., Peters, J., Benner, L. & Hopf, A. (2007). A meta-analysis of school-based social skills interventions for children with autism spectrum disorders. *Remedial and Special Education, 28*(3), 153-162. Retrieved from https://pdfs.semanticscholar.org/2420/8a5393d424a3306f80c5ae56f9e355088374.pdf

Bergelson, E. & Swingley, D. (2012). At 6-9 months, human infants know the meanings of many common nouns. *Proceedings of the National Academy of Sciences, 109*(9),

3253-8. Doi:10.1073/pnas.1113380109.

Berko Gleason, J. (2005). *The development of language* (6th ed.). Boston, MA: Pearson Education, Inc.

Berument, S., Rutter, M., Lord, C., Pickles, A. & Bailey, A. (1999). Autism screening questionnaire: diagnostic validity. *The British Journal of Psychiatry, 175*, 444-51. Doi:10.1192/bjp.175.5.444.

Beukelman, D. R., & Mirenda, P. (2013). *Augmentative and alternative communication: Supporting children and adults with complex communication needs* (4th ed.). Baltimore, MD: Brookes.

Bhat, A. N., Galloway, J. C. & Landa, R. J. (2010). Social and non-social visual attention patterns and associative learning in infants at risk for autism. *Journal of Child Psychology and Psychiatry, 51*(9), 989-997. Doi:10.1111/j.1469-7610.2010.02262.x

Biederman, G. B. & Freedman, B. (2007). Modeling skills, signs and lettering for children with Down syndrome, autism and other severe developmental delays by video instruction in classroom setting. *Journal of Early and Intensive Behavior Intervention, 4*(4), 736-743. Retrieved from http://dx.doi.org/10.1037/h0100403

Bierman, K. L., Torres, M. M., Domitrovich, C. E., Welsh, J. A., & Gest, S. D. (2009). Behavioral and cognitive readiness for school: Cross-domain associations for children attending Head Start. *Social Development, 18*(2), 305–323. Doi:10.1111/j.1467-9507.2008.00490.x

Bishop-Fitzpatrick, L., Mazefsky, C., Eack, S. & Minshew, N. (2017). Correlates of social functioning in autism spectrum disorder: The role of social cognition. *Research in Autism Spectrum Disorders, 35*, 25-34. Doi:10.1016/j.rasd.2016.11.013

Blair, R. J. R. (2008). Fine cuts of empathy and the amygdala: dissociable deficits in psychopathy and autism. *The Quarterly Journal of Experimental Psychology, 61*(1), 157-170. Retrieved from https://doi.org/10.1080/17470210701508855

Booth, R. & Happe, F. (2010). “Hunting with a knife and … fork”: Examining central coherence in autism, attention deficit/hyperactivity disorder, and typical development with a linguistic task. *Journal of Experimental Child Psychology, 104*(4), 377-393. Retrieved from https://doi.org/10.1016/j.jecp.2010.06.003

Botvinick, M., Jha, A. P., Bylsma, L. M., Fabian, S. A., Solomon, P. E. & Prkachin, K. M. (2005). Viewing facial expressions of pain engages cortical areas involved in the direct experience of pain. *Neuroimage, 25,* 312-319. Retrieved from https://doi.org/10.1016/j.neuroimage.2004.11.043.

Brosch, T., Scherer, K., Grandjean, D. & Sander, D. (2013). The impact of emotion on perception, attention, memory, and decision-making. *Swiss Medical Weekly, 143*, w13786. Doi:10.4414/smw.2013.13786

Brothers, L. (1996). Brain mechanisms of social cognition. *Journal of Psychopharmacology, 10*(1), 2-8. Retrieved from https://doi.org/10.1177/026988119601000102

Buggey, T., Crawford, C. & Rogers C. (2018). Self-modeling to promote social initiations with young children with developmental disabilities. *Focus on Autism and Other Developmental Disabilities*, *33*(2), 111-119 Retrieved from http://www.researchgate.net/publication/327189738_Self-Modeling_to_Promote_Social_Initiations_With_Young_Children_With_Developmental_Disabilities

Buggey, T. (2005). Video self-modeling applications with students with autism spectrum disorder in a small private school setting. *Focus on Autism and Other Developmental Disabilities, 20*(1), 52-63 Retrieved from https://doi.org/10.1177/10883576050200010501.

Buggey, T. (2007). A picture is worth: video self-modeling applications at school and at home. *Journal of Positive Behavior Interventions, 9*(3), 151-158 Doi:10.1177/10983007070090030301

Buggey, T. (2009). *Topics in autism. Seeing is believing: Video self-modeling for people with autism and other developmental disabilities*. Bethesda, MD: Woodbine House.

Buggey, T., Hoomes, G., Sherberger, E. & Williams, S. (2011). Facilitating social initiations of pre-schoolers with autism spectrum disorders using video self-modeling. *Focus on Autism and Other Developmental Disabilities, 26*(1), 25-36. Retrieved from http://www.researchgate.net/publication/258137262_Facilitating_Social_Initiations_of_Preschoolers_With_Autism_Spectrum_Disorders_Using_Video_Self-Modeling. Doi: 10.1177/1088357609344430

Buggey, T. & Ogle, L. (2012). Video self-modeling. *Psychology in the Schools, 49*(1), 52-70 Doi:10.1002/pits.20618.

Buggey, T., Toombs, K., Gardener, P. & Cervetti, M. (1999). Training responding behaviours in students with autism using videotaped self-modeling. *Journal in Positive Behaviour Interventions, 1*(4), 205-214. Retrieved from https://www.researchgate.net/publication/247784600_Training_Responding_Behaviors_in_Students_with_Autism_Using_Videotaped_Self-Modeling

Burrell, T. L. & Borrego, J., Jr. (2012). Parents' involvement in ASD treatment: what is their role? *Cognitive and Behavioral Practice, 19*(3), 423-432. Retrieved from https://doi.org/10.1016/j.cbpra.2011.04.003.

Bzdok, D., Schilbach, L., Vogeley, K., Schneider, K. Laird, A. & Langner, R. (2012). Parsing the neural correlates of moral cognition: ALE meta-analysis on morality, theory of mind, and empathy. *Brain Structure & Function, 217*(4), 783–796. Doi:10.1007/s00429-012-0380-y

Cacioppo, S., Capitano, J. P., & Cacioppo, J. T. (2014). Toward a neurology of loneliness. *Psychological Bulletin, 140*(6), 1464-1504. Retrieved from http://dx.doi.org/10.1037/a0037618

Callaghan, P. & Morrissey, J. (1993). Social support and health: a review. *Journal of*

Advanced Nursing, 18(2), 203-10. Doi:10.1046/j.1365-2648.1993.18020203.x

Campbell, J. E., Morgan, M., Barnett, V., & Spreat, S. (2015). Handheld devices and video modeling to enhance the learning of self-help skills in adolescents with autism spectrum disorder. *Occupation, Participation and Health, 35*(2), 95-100. Doi:10.1177/1539449215570040.

Cardon, T. A., & Wilcox, M. (2011). Promoting imitation in young children with autism: A comparison of reciprocal imitation training and video modeling. *Journal of Autism and Developmental Disorders, 41*(5), 654-666. Retrieved from https://doi.org/10.1007/s10803-010-1086-8.

Carlson, S. M., Mandel, D. J. & Williams, L. (2004). Executive function and theory of mind: stability and prediction from ages 2 to 3. *Developmental Psychology, 40*(6), 1105-1122. Retrieved from http://dx.doi.org/10.1037/0012-1649.40.6.1105

Carr, E. G., Dunlap, G., Horner, R. H., Koegel, R. L. Turnbull, A. P., Sailor, W. … Fox, L. (2002). Positive behavior support: evolution of an applied science. *Journal of Positive Behavioral Intervention, 4*(1), 4-16. Retrieved from http://dx.doi.org/10.1177/109830070200400102.

Carter, A. S., Wagmiller, R. J., Gray, S. A. O. McCarthy, K. J., Horwitz, S. M. & Briggs-Gowan, M. J. (2010). Prevalence of DSM-IV disorder in a representative, healthy birth cohort at school entry: sociodemographic risks and social adaptation. *Journal of the American Academy of Child & Adolescent Psychiatry, 49*(7), 686-698. Retrieved from https://doi.org/10.1016/j.jaac.2010.03.018

Ceponiene, R., Lepisto, T., Shestakova, A., Vanhala, R., Alku, P., & Yaguchi, K. (2003). Speech–sound-selective auditory impairment in children with autism: They can perceive but do not attend. *Proceedings of the National Academy of Sciences of the United States of America, 100*(9), 5567-5572. Retrieved from https://doi.org/10.1073/pnas.0835631100

Chandler, S., Charman, T., Baird, G., Simonoff, E., Loucas, T., Meldrum, D. … Pickles, A. (2007). Validation of the social communication questionnaire in a population cohort of children with autism spectrum disorders. *Journal of the American Academy of Child and Adolescent Psychiatry, 46*(10), 1324-1332. Doi:https://doi.org/10.1097/chi.0b013e31812f7d8d

Charlop-Christy, M., Le, L. & Freeman, K. (2000). A comparison of video modeling with in vivo modeling for teaching children with autism. *Journal of Autism and Developmental Disorders, 30*(6). Retrieved from http://tvteachervideos.com/assets/a_comparison_of_video_modeling_with_in_vivo_modeling-charlop-christy-2000.pdf

Charman, T., Baron-Cohen, S., Swettenham, J., Baird, G., Drew A., & Cox, A. (2003). Predicting language outcome in infants with autism and pervasive developmental disorder. *International Journal of Language and Communication Disorders, 38*(3), 265-85. Doi:10.1080/136820310000104830

Chassiakos, Y. L. R., Radesky, J., Christakis, D., Moreno, M. A., & Cross, C. (2016). Children and adolescents and digital media. *Pediatrics, 138*(5), e20162593. Doi:10.1542/peds.2016-2593.

Chawarska, K., Paul, R., Klin, A., Hannigan, S., Dichtel, L. E. & Volkmar, F. (2007). Parental recognition of developmental problems in toddlers with autism spectrum disorders. *Journal of Autism and Developmental Disorders, 37*(1), 62-72. Doi:10.1007/s10803-006-0330-8.

Chesnut, S., Wei, T., Barnard-Brak, L. & Richman, D. (2017). A meta-analysis of the social communication questionnaire: Screening for autsm spectrum disorder. *Autism, 21*(8), 920-928. Doi:10.1177/1362361316660065

Christensen, D., Baio J., Braun, K., Bilder, D., Charles, J., Constantino, J., …Yeargin-Allsopp, M. (2016). Prevalence and characteristics of autism spectrum disorder among

children aged eight years – autism and developmental disabilities monitoring network, 11 sites, united states, 2012. *Morbidity and Mortality Weekly Report, 65*(3), 1-23. Doi:http://dx.doi.org/10.15585/mmwr.ss6503a1

Cho, I. Y. K., Jelinkova, K., Schuetze, M., Vinette, S. A., Rahman, S., McCrimmon, A. … Bray, S. (2017). Circumscribed interests in adolescents with Autism Spectrum Disorder: A look beyond trains, planes, and clocks. *Public Library of Science, 12*(11), e0187414. Doi:10.1371/journal.pone.0187414

Ciarrochi, J., Scott, G., Deane, F. P. & Heaven, P. C. L. (2003). Relations between social and emotional competence and mental health: a construct validation study. *Personality and Individual Differences, 35*(8), 1947-1963. Retrieved from http://dx.doi.org/10.1016/S0191-8869(03)00043-6

Cohen, M. J. & Sloan, D. L. (2007). *Visual supports for people with autism: a guide for parents and professionals*. Bethesda, MD: Woodbine House.

Cook, (n.d.). *What is social communication?* Retrieved from https://1pdf.net/what-is-social-communication-southern-connecticut-state-_5850f6f6e12e89cd355177b3

Cooper, J. O., Heron, T. E., & Heward, W. L. (1987). *Applied behavior analysis*. Columbus, OH, England: Merrill Publishing Co.

Corbett, B. & Abdullah, M. (2005). Video modeling: why does it work for children with autism? *Journal of Early and Intensive Behaviour Intervention, 2*(1), 2-8. Retrieved from http://files.eric.ed.gov/fulltext/EJ846467.pdf

Corbett, B., Key, A., Qualls, L., Fecteau, S., Newsom, C., Coke, C. & Yoder, P. (2016). Improvement in social competence using a randomized trial of a theatre intervention for children with autism spectrum disorder. *Journal of Autism and Developmental Disorders, 46*(2), 658-672. Retrieved from https://doi.org/10.1007/s10803-015-2600-9

Corbett, B., A., Schupp, C. W., & Lanni, K. E. (2012). Comparing biobehavioral profiles across two social stress paradigms in children with and without autism spectrum

disorders. *Molecular Autism, 3*(13). Retrieved from https://doi.org/10.1186/2040-2392-3-13.

Cordaro, D. T., Sun, R., Keltner, D., Kamble, S., Huddar, N. & McNeil, G. (2018). Universals and cultural variations in 22 emotional expressions across five cultures. *Emotion, 18*(1), 75-93. Doi:10.1037/emo0000302.

Corsello, C. M. (2005). Early intervention in autism. *Infants and Young Children, 18*(2), 74-85. Doi:10.1097/00001163-200504000-00002.

Cossu, G., Boria, S., Copioli, C., Bracceschi, R., Giuberti, V., Santelli, E. & Gallese, V. (2012). Motor representation of actions in children with autism. *PLoS One, 7*(9), e44779. Doi:10.1371/journal.pone.0044779.

Cox, J. N. (2018). *The effect of video peer-modelling and video self-modelling on the adaptive behaviour of students with autism spectrum disorder using a single-subject research design*. (Unpublished master's thesis). University of Canterbury, Christchurch, New Zealand.

Coyle, C. & Cole, P. (2004). A videotaped self-modeling and self-monitoring treatment program to decrease off-task behaviour in children with autism. *Journal of Intellectual and Developmental Disability, 29*(1), 3-15.

Creer, T. & Miklich, D. (1970). The application of a self-modeling procedure to modify inappropriate behaviour: A preliminary report. *Behaviour Research and Therapy, 8*(1), 91-92. Retrieved from https://www.sciencedirect.com/science/article/pii/0005796770900409

Curenton, S. M. & Justice, L. M. (2004). African American and Caucasian preschoolers' use of decontextualized language: literate language features in oral narratives. *Language, Speech and Hearing Services in Schools, 35*(3), 240-53. Doi:10.1044/0161-1461(2004/023)

D'Ateno, P., Mangiapanello, K. & Taylor, B. A. (2003). Using video modeling to teach

complex play sequences to a pre-schooler with autism. *Journal of Positive Behavior Interventions, 5*(1), 5-11. Retrieved from https://doi.org/10.1177/10983007030050010801.

Dael, N., Mortillaro, M. & Scherer, K. R. (2012). Emotion expression in body action and posture. *Emotion, 12*(5), 1085–1101. Doi:10.1037/a0025737.

Dakin, S. & Frith, U. (2005). Vagaries of visual perception in autism. *Neuron, 48*(3), 497-507. Doi:10.1016/j.neuron.2005.10.018

Dallery, J., Cassidy, R. & Raiff, B. (2013). Single-case experimental designs to evaluate novel technology-based health interventions. *Journal of Medical Internet Research, 15*(2), e22. Doi:10.2196/jmir.2227.

Damiano, C. R., Mazefsky, C. A., White, S. W. & Dichter, G. S. (2014). Future directions for research in autism spectrum disorders. *Journal of Clinical Child and Adolescent Psychology, 43*(5), 828-43. Doi:10.1080/15374416.2014.945214.

Davies, M. S., Dapretto, M., Sigman, M., Sepeta, L. & Bookheimer, S. Y. (2011). Neural bases of gaze and emotion processing in children with autism spectrum disorders. *Brain and Behavior, 1*(1), 1-11. Doi:10.1002/brb3.6.

Davis, N. F. (2019). *Using behavior skills training and video self-modeling to improve greetings in the workplace,* (Unpublished Master's Thesis). Sam Houston State University, Huntsville, Texas.

Davis, N.O. & Carter, A.S. (2008). Parenting stress in mothers and fathers of toddlers with autism spectrum disorders: Associations with child characteristics. *Journal of Autism and Developmental Disorders, 38,* 1278-1291. Retrieved from http://dx.doi.org/10.1007/s10803-007-0512-z.

Davison, I. (2019, March 14). 'Every hour is questioned': Advocates say health ministry quietly reducing funding for disabled after ruling out big cuts. *NZ Herald*. Retrieved from https://www.nzherald.co.nz/nz/news/article.cfm?c_id=1&objectid=12212304

De Marcheta, A. & Eigsti, I. (2016). The art of common ground: Emergence of a complex pragmatic language skill in adolescents with autism spectrum disorders. *Journal of Child Language, 43*(1), 43-80. Retrieved from https://doi.org/10.1017/S0305000915000070.

De-la-Iglesia, M. & Olivar, J. (2015). Risk factors for depression in children and adolescents with high functioning autism spectrum disorders. *Scientific World Journal, 2015*, 127853. Doi:10.1155/2015/127853.

Decety, J. & Svetlova, M. (2012). Putting together phylogenetic and ontogenetic perspectives on empathy. *Developmental Cognitive Neuroscience,* 2(1), 1-24. Doi:10.1016/j.dcn.2011.05.003

Decker, M. & Buggey, T. (2012). Using video self-and peer modeling to facilitate reading fluency in children with learning disabilities. *Journal of Learning Disabilities.* Retrieved from http://journals.sagepub.com/doi/abs/10.1177/0022219412450618

Delano, M. (2007). Video modeling interventions for individuals with autism. *Remedial and Special Education,* 28(1), 33-42. Retrieved from http://vsmproject.pbworks.com/f/video+modeling.pdf

Denham, S. A., Kalb, S., Warren-Khot, H, Rhoades, B. L. & Bassett, H. H. (2013). Social and emotional information processing in preschoolers: Indicator of early school success? *Early Child Development and Care, 183*(5), 667–688. Doi:10.1080/03004430.2012.682728.

DePape, A. R., Hall, G. B. C., Tillman, B. & Trainor, L. J. (2012). Auditory processing in high-functioning adolescents with autism spectrum disorder. *PLoS ONE, 7*(9), e44084. Retrieved from https://doi.org/10.1371/journal.pone.0044084.

Dharani, K. (2015). *The biology of thought*. London, UK: Elsevier Inc.

Dichter, G. & Adolphs, R. (2012). Reward processing in autism: a thematic series. *Journal of Neurodevelopmental Disorders, 2012*(4), 20. Retrieved from

https://doi.org/10.1186/1866-1955-4-20

Dillon, S.R. (2008, April). *Time-delayed video feedback in physical education: A pilot study*. Poster presentation presented at the 2008 American Alliance for Health, Physical Education, Recreation and Dance (AAHPERD) National Convention and Exposition, Fort Worth, TX. Retrieved from http://aahperd.confex.com/aahperd/2008/preliminaryprogram/abstract_11673.htm

Dolan, R. J. (2002). Emotion, cognition, and behaviour. *Science, 298*(5596), 1191-1194. Doi:10.1126/science.1076358

Dowrick, P. W. (2012a). Self-model theory: learning from the future. *WIREs Cognitive Science, 3*(2), 215-230. Retrieved from https://doi.org/10.1002/wcs.1156.

Dowrick, P. W. (2012b). Self-modeling: expanding the theories of learning. *Psychology in the Schools*, 2012(49), 1. Doi:10.1002/pits.20613.

Dvash, J., & Shamay-Tsoory, S. G. (2014). Theory of mind and empathy as multidimensional constructs: Neurological foundations. *Topics in Language Disorders, 34*(4), 282-295. Retrieved from http://dx.doi.org/10.1097/TLD.0000000000000040.

Eastvold, A., Belanger, H., & Vanderploeg, R. (2012). Does a third-party observer affect neuropsychological test performance? It depends. *The Clinical Neuropsychologist, 26*(3), 520-41. Doi:10.1080/13854046.2012.663000.

Eaves, L., Wngert, H., Ho, H. & Mickelson E. (2006). Screening for autism spectrum disorders with the social communication questionnaire. *Journal of Developmental and Behavioral Pediatrics. 27*(2), S95-S103. Retrieved from https://www.ncbi.nlm.nih.gov/pubmed/16685191

Edwards, L. A. (2014). A meta-analysis of imitation abilities in individuals with autism spectrum disorders. *Autism Research, 7*(3). Retrieved from https://doi.org/10.1002/aur.1379.

Ekman, P., Friesen, W., O'Sullivan, M., Chan, A., Diacoyanni-Tarlatzis, I., Heider, K.

…Tzavaras, A. (1987). Universals and cultural differences in the judgments of facial expressions of emotion. *Journal of Personality and Social Psychology, 53*(4), 712-717. Retrieved from http://dx.doi.org/10.1037/0022-3514.53.4.712

Elder, J. H., Kreider, C. M., Brasher, S. N., & Ansell, M. (2017). Clinical impact of early diagnosis of autism on the prognosis and parent-child relationships. *Psychology Research and Behavior Management, 2017*, 283-292. Retrieved from https://doi.org/10.2147/PRBM.S117499

Elleseff, T. (2016, February 03). *Importance of assessing social pragmatic abilities in children with language difficulties.* Retrieved from https://www.smartspeechtherapy.com/in-case-you-missed-it-importance-of-assessing-social-pragmatic-abilities-in-children-with-language-difficulties/

Emery, N. J. (2000). The eyes have it: the neuroethology, function and evolution of social gaze. *Neuroscience and Biobehavioral Reviews, 24*(6), 581-604. Retrieved from https://doi.org/10.1016/S0149-7634(00)00025-7.

Ence, W. A. (2012). *Effects of video feedback on parent implementation of pivotal response treatment* (Doctoral dissertation). Retrieved from ProQuest Dissertations and Theses database. (UMI No. 3545141)

Farrar, M. J. & Maag, L. (2002). Early language development and the emergence of a theory of mind. *First Language, 22*, 197–213. Retrieved from https://doi.org/10.1177/014272370202206504

Fein, D., Barton, M., Eigsti, I., Kelly, E., Naigles, L., Schultz, R. … Tyson, K. (2013). Optimal outcome in individuals with a history of autism. *The Journal of Child Psychology and Psychiatry, 54*(2), 195-205. Retrieved from https://doi.org/10.1111/jcpp.12037

Feinberg, M. J. (2002). *Using social stories to teach specific social skills to individuals diagnosed with autism* (Doctoral Dissertation). California School of Professional

Psychology. San Diego, California. Retrieved from https://elibrary.ru/item.asp?id=5235889

Feldman, M.A., & Werner, S.E. (2002). Collateral effects of behavioral parent training on families of children with developmental disabilities and behavior disorders. *Behavioral Interventions, 17*(2), 75-83. Doi:10.1002/bin.111

Fey, M. (2014). A five phase model of intervention research. *Clinical Research Education*. Doi:10.1044/cred-gsd-r101-001. Retrieved from https://academy.pubs.asha.org/2014/01/a-five-phase-model-of-intervention-research/

Fey, M. E. & Finestack, L. H. (2009). Research and development in child language intervention: A five-phase model. In R. G. Schwartz (Ed.). *Handbook of child language disorders* (pp. 513-531). New York, NY: Psychology Press.

Fletcher-Watson, S., Leekam, S. R., Benson, V., Frank, M. C. & Findlay, J. M. (2008). Eye-movements reveal attention to social information in autism spectrum disorder. *Neuropsychologia, 47*(2009), 248-257. Doi:10.1016/j.neuropsychologia.2008.07.016.

Foti, F., Piras, F., Vicari, S., Mandolesi, L. Petrosini, L. & Menghini, D. (2019). Observational learning in low-functioning children with autism spectrum disorders: a behavioral and neuroimaging study. *Frontiers in Psychology, 9*(9), 2737. Doi:10.3389/fpsyg.2018.02737.

Foti, F., Mazzone, L., Menghini, D., De Peppo, L., Federico, F., Postorino, V., ... Vicari, S. (2014). Learning by observation in children with autism spectrum disorder. *Psychological Medicine, 44*(11), 2437-2447. Retrieved from https://doi.org/10.1017/S003329171300322X.

Franzone, E. & Collet-Klingenberg, L. (2008). *Overview of video modeling*. Madison, WI: The National Professional Development Center on Autism Spectrum Disorders, Waisman Center, University of Wisconsin. Retrieved from jhttp://autismpdc.fpg.unc.edu/sites/autismpdc.fpg.unc.edu/files/imce/documents/Video

Modeling_Complete.pdf

Frith, C.D. (2012). The role of metacognition in human social interactions. *Philosophical Transactions of the Royal Society of London, Series B, Biological Sciences*, 2012(367), 2213-2223. Doi:10.1098/rstb.2012.0123

Frith, C. D. (2008). Social cognition. *Philosophical transactions of the Royal Society of London, Series B, Biological Sciences, 363*(1499): 2033-2039. Retrieved from https://doi.org/10.1098/rstb.2008.0005.

Frith, C. D. & Frith, U. (2007). Social cognition in humans. *Current Biology, 17*(16), R724-R732. Retrieved from https://doi.org/10.1016/j.cub.2007.05.068

Frith, C. D. & Frith, U. (2008). Implicit and explicit processes in social cognition. *Neuron, 60*(3), 503-510. Retrieved from https://doi.org/10.1016/j.neuron.2008.10.032.

Frith, U. (2003). *Autism: explaining the enigma* (2nd ed.). Malden: Blackwell Publishing

Frith, U. & Frith, C. D. (2003). Development and neurophysiology of mentalizing. *Philosophical Transactions of the Royal Society B Biological Sciences, 358*, 459-473. Retrieved from https://doi.org/10.1098/rstb.2002.1218.

Frith, C. D. & Singer, T. (2008). The role of social cognition in decision making. *Philosophical Transactions of the Royal Society B, Biological Sciences, 363*(1511), 3875-86. Doi:10.1098/rstb.2008.0156.

Frost, L. A., & Bondy, A. S. (2002). *The picture exchange communication system training manual* (2nd ed.). Newark: Pyramid Educational Products.

Fuld, S. (2018). Autism spectrum disorder: The impact of stressful and traumatic life events and implications for clinical practice. *Clinical Social Work Journal, 46*(3), 210–219. Doi:10.1007/s10615-018-0649-6

Gallagher, S. & Hutto, D. (2008). Understanding others through primary interaction and narrative practice. In: J. Zlatev, T. Racine, C. Sinha & E. Itkonen (Eds.). *The Shared Mind: Perspectives on Intersubjectivity* (pp.17-38). Amsterdam: John Benjamins.

Retrieved from https://www.researchgate.net/publication/285050204_2_Understanding_others_through_primary_interaction_and_narrative_practice.

Gallese, V., Keysers, C. & Rizzolatti, G. (2004). A unifying view of the basis of social cognition. *Trends in Cognitive Sciences, 8*(9), 396-403. Retrieved from https://doi.org/10.1016/j.tics.2004.07.002.

Ganz, J. B., Bourgeois, B. C., Flores, M. M. & Campos, B. A. (2008). Implementing visually cued imitation training with children with autism spectrum disorders and developmental delays. *Journal of Positive Behavior Interventions, 10*(1), 56-66. Retrieved from https://doi.org/10.1177/1098300707311388.

Ganz, J. B., Kaylor, M., Bourgeois, B., & Hadden, K. (2008). The impact of social scripts and visual cues on verbal communication in three children with autism spectrum disorders. *Focus on Autism and Other Developmental Disabilities, 23*(2), 79-94. Doi:10.1177/1088357607311447.

Garon, N., Bryson, S. E. & Smith, I. M. (2008). Executive function in pre-schoolers: a review using an integrative framework. *Psychological Bulletin, 134*(1), 31-60. Doi:10.1037/0033-2909.134.1.31.

Gast, D.L., & Ledford, J.R. (Eds.). (2014). *Single case research methodology: Applications in special education and behavioral sciences* (2nd ed.). New York, NY: Routledge/Taylor & Francis Group.

Gelbar, N., Anderson, C., McCarthy, S. & Buggey T. (2012). Video self-modeling as an intervention strategy for individuals with autism spectrum disorders. *Psychology in the Schools, 49*(1), 15-22. Retrieved from https://www.researchgate.net/publication/259873157_Video_self-modeling_as_an_intervention_strategy_for_individuals_with_Autism_Spectrum_Disorders

Gillon, G. T. (2004). *Challenges in language and literacy. Phonological awareness: From research to practice*. New York, NY: Guilford Press.

Goodman, R. (1997). The Strengths and Difficulties Questionnaire: a research note. *Journal of Child Psychology and Psychiatry*, *38*(5), 581–586. Retrieved from https://onlinelibrary.wiley.com/doi/pdf/10.1111/j.1469-7610.1997.tb01545.x.

Goodwyn, F. D., Hatton, H. L., Vannest, K. J., & Ganz, J. B. (2013). Video modeling and video feedback interventions for students with emotional and behavioural disorders. *Beyond Behavior*, *22*(2), 14-18. Retrieved from https://doi.org/10.1177/107429561302200204.

Goudbeek, M. & Scherer, K. (2010). Beyond arousal: valence and potency/control cues in the vocal expression of emotion. *The Journal of the Acoustical Society of America, 128*(3), 1322-36. Doi:10.1121/1.3466853.

Gray, C., White A. L. & McAndrew, S. (2002). *My Social Stories Book*. London, UK: Jessica Kingsley Publishers.

Greenspan, S. I. & Weider, S. (1999). A functional developmental approach to autistic spectrum disorders. Journal of the Association for Persons with Severe Handicaps, 24(3), 147-161. Retrieved from https://doi.org/10.2511/rpsd.24.3.147.

Griffith, G. M., Hastings, R. P., Nash, S. & Hill, C. (2010). Using matched groups to explore child behavior problems and maternal well-being in children with Down syndrome and autism. *Journal of Autism and Developmental Disorders, 40*(5), 610-9. Doi:10.1007/s10803-009-0906-1.

Griffiths, R. D. P. (1974). Videotape feedback as a therapeutic technique: Retrospect and prospect. *Behaviour Research and Therapy, 12*(1), 1-8. Retrieved from https://doi.org/10.1016/0005-7967(74)90025-4.

Hagopian, L. & Graham, C. (2009). Problem behaviour in autism. *Interactive Autism Network*. Retrieved from https://iancommunity.org/cs/articles/prob_behav

Happe, F. G. (1996). Studying weak central coherence at low levels: Children with autism do not succumb to visual illusions. A research note. *Journal of Child Psychology and Psychiatry, 37*(7), 873-7. Retrieved from https://doi.org/10.1111/j.1469-7610.1996.tb01483.x

Happe, F. G. E. (2011). Central coherence and theory of mind in autism: Reading homographs on context. *British Journal of Developmental Psychology, 15*(1). Retrieved from https://doi.org/10.1111/j.2044-835X.1997.tb00721.x

Hartley, S. L., Sikora, D. M. & McCoy, R. (2008). Prevalence and risk factors of maladaptive behaviour in young children with Autistic Disorder. *Journal of Intellectual Disability Research, 52*(10), 819–829. Doi: 10.1111/j.1365-2788.2008.01065.x

Hedges, S. H., Odom, S. L., Hume, K. & Sam, A. (2018). Technology use as a support tool by secondary students with autism. Autism, 22(1), 70-79. Retrieved from https://doi.org/10.1177/136236131771797.

Heyes, C. M. & Frith, C. D. (2014). The cultural evolution of mind reading. *Science, 344*(6190), Article ID 1243091. Doi:10.1126/science.1243091

Hitchcock, C. H., Dowrick, P. W. & Prater, M. A. (2003). Video self-modeling intervention in school-based settings: A review. *Remedial and Special Education, 24*(1), 36-45. Doi:10.1177/074193250302400104

Hobson, R. P., Ouston, J. & Lee, A. (1988). What's in a face? The case of autism. *British Journal of Psychology, 79*(Pt 4), 441-53. Retrieved from https://www.ncbi.nlm.nih.gov/pubmed/3208000

Hodgdon, L. Q. (1995). Solving social-behavioral problems through the use of visually supported communication. In K. A. Quill (Ed.), *Teaching children with autism: Strategies to enhance communication and socialization* (pp. 265-286). New York, NY: Delmar.

Hodgdon, L. Q. (2000). *Visual strategies for improving communication: Practical supports*

for school and home. Troy, MI: Quirk Roberts.

Hodgdon, L. Q. (2012). *Discovering the possibilities with visual strategies: Meeting the communication, behavior and social skill challenges in autism spectrum disorders and related learning needs*. Retrieved from http://www.dcc-cde.ca.gov/documents/HANDOUT-%20DISCOVER-2012-REV5.pdf

Holst, A. (2019). Smartphone users worldwide 2016-2021. *Statista*. Retrieved from https://www.statista.com/statistics/330695/number-of-smartphone-users-worldwide/

Howard, M. A., Cowell, P. E., Boucher, J., Broks, P., Mayes, A., Farrant, A. & Robersts, N. (2000). Convergent neuroanatomical and behavioural evidence of an amygdala hypothesis of autism. *Neuroreport, 11*(13), 2931-5. Doi:10.1097/00001756-200009110-00020

Huang, C. Y., Yen, H. C., Tseng, M. H., Tung, L. C., Chen, Y. D. & Chen, K. L. (2014). Impacts of autistic behaviors, emotional and behavioral problems on parenting stress in caregivers of children with autism. *Journal of Autism and Developmental Disorders, 44*(6), 1383-90. Doi:10.1007/s10803-013-2000-y.

Hull, L., Petrides, K. V., Allison, C., Smith, P., Baron-Cohen, S., Lai, M. & Mandy, W. (2017). "Putting on my best normal": social camouflaging in adults with autism spectrum conditions. *Journal of Autism and Developmental Disorders, 47*(8), 2519-2534. Doi:10.1007/s10803-017-3166-5.

Hume, K., Lofin, R. & Lantz, J. (2009). Increasing independence in autism spectrum disorders: a review of three focused interventions. *Journal of Autism and Developmental Disorders, 39*(9), 1329-38. Doi:10.1007/s10803-009-0751-2.

Humphrey, N. & Symes, W. (2011). Peer interaction patterns among adolescents with autistic spectrum disorders (ASDs) in mainstream school settings. *Autism, 15*(4), 397-419. Doi:10.1177/1362361310387804.

Ingersoll, B. (2008a). The effect of context on imitation skills in children with autism.

Research in Autism Spectrum Disorders, 2(2), 332–340. Doi:10.1016/j.rasd.2007.08.003.

Ingersoll, B. (2008b). The social role of imitation in autism: implications for the treatment of imitation deficits. *Infants and young children 21*(2), 107-119. Doi:10.1097/01.IYC.0000314482.24087.14.

Ingersoll, B. (2010). Teaching social communication: a comparison of naturalistic behavioral and developmental, social pragmatic approaches for children with autism spectrum disorders. *Journal of Positive Behavior Interventions, 12*(1). Doi:10.1177/1098300709334797.

Ingersoll, B. & Hambrick, D. Z. (2011). The relationship between the broader autism phenotype, child severity, and stress and depression in parents of children with autism spectrum disorders. *Research in Autism Spectrum Disorders, 5*(1), 337-344. Retrieved from https://doi.org/10.1016/j.rasd.2010.04.017.

Ingersoll, B. & Schreibman, L. (2006). Teaching Reciprocal Imitation Skills to Young Children with Autism Using a Naturalistic Behavioral Approach: Effects on Language, Pretend Play, and Joint Attention. *Journal of Autism and Developmental Disorders, 36*(4), 487-502. Doi:10.1007/s10803-006-0089-y.

Inglebret, E., Jones, C., and Pavel. D. M. (2008). Integrating American Indian/Alaska native culture into shared storybook intervention. *Language, Speech and Hearing Services in Schools, 39*(4), 521-7. Doi:10.1044/0161-1461(2008/07-0051).

Jarrold, C., Butler, D., Cottington, E. & Jimenez, F. (2000). Linking theory of mind and central coherence bias in autism and in the general population. *Developmental Psychology, 36*(1), 126-38. Doi:10.1037//0012-1649.36.1.126.

Johnston, S., Nelson, C., Evans, J. & Palazolo, K. (2009). The use of visual supports in teaching young children with autism spectrum disorder to initiate interactions. *Augmentative and Alternative Communication, 19*(2), 86-103. Retrieved from

https://doi.org/10.1080/07434610410001716230

Jones, C. D. & Schwartz, I. S. (2009). When asking questions in not enough: an observational study of social communication differences in high functioning children with autism. *Journal of Autism and Developmental Disorders, 39*, 432-443. Doi:10.1007/s10803-008-0642-y

Jones, D. E., Greenberg, M. & Crowley, M. (2015). Early social-emotional functioning and public health: The relationship between kindergarten social competence and future wellness. *American Journal of Public Health, 105*(11), 2283-2290. Retrieved from https://ajph.aphapublications.org/doi/10.2105/AJPH.2015.302630

Jones, W. & Klin, A. (2009). Heterogeneity and homogeneity across the autism spectrum: the role of development. In P. J. Lombroso *Journal of the American Academy of Child and Adolescent Psychiatry, 48*(5), 471-473. Doi:https://doi.org/10.1097/CHI.0b013e31819f6c0d

Kabashi, L. & Kaczmarek, L. A. (2017). Teaching social initiation skills to young children with autism using video self-modeling with video feedback. *Autism Open Access, 7*, 212. Doi:10.4172/2165-7890.1000212.

Kaiser S. & Wehrle, T. (2001). Facial expression as indicators of appraisal processes. In K. R. Scherer, A. Schorr, & T. Johnstone. *Appraisal process in emotions: Theory, methods and research* (pp. 285-300). New York, NY: Oxford University Press.

Karp, E. A., Dudovitz, R, Nelson, B. B., Shih, W., Gulsrud, A., Olrich, F. …Kuo, A. A. (2018). Family characteristics and children's receipt of autism services in low-resourced families. *Pediatrics, 2018*(141), supplement 4. Retrieved from https://pediatrics.aappublications.org/content/141/Supplement_4/S280

Karst, J. S. & Van Hecke, A. V. (2012). Parent and family impact of autism spectrum disorders: a review and proposed model for intervention evaluation. *Clinical Child and Family Psychology Review, 15*(3), 247-77. Doi:10.1007/s10567-012-0119-6.

Kashino, M. & Lin, F. (2016). Difficulty with selective listening in autism spectrum disorder. *The Journal of the Acoustical Society of America, 140*, 3209. Retrieved from https://doi.org/10.1121/1.4970102

Kato, M. & Konishi, Y. (2013). Where and how infants look: The development of scan paths and fixations in face perception. *Infant Behavior & Development, 36*(1), 32–41. Retrieved from https://doi.org/10.1016/j.infbeh.2012.10.005

Kazdin, A. E. (2011). *Single-case research designs* (2nd ed.). New York, NY: Oxford University Press.

Keehn, B., Kadlaska, G., McNally Keehn, R. & Francis, A. L. (2019). Auditory attentional disengagement in children with autism spectrum disorder. *Journal of Autism and Developmental Disorders.* Doi:10.1007/s10803-019-04111-z.

Keenan, C., Thurston, A. & Urbanska, K. (2017). Video-based interventions for promoting positive social behaviour in children with autism spectrum disorders: a systematic review and meta-analysis. *The Campbell Collaboration*. Retrieved from https://www.researchgate.net/publication/315769308_Video-based_interventions_for_promoting_positive_social_behaviour_in_children_with_autism_spectrum_disorders_a_systematic_review_and_meta-analysis

Kehle, T. J., Bray, M. A., Margiano, S., Theodore, L. A., & Zhou, Z. (2002). Self-modeling as an effective intervention for students with serious emotional disturbance: Are we modifying children's memories? *Psychology in the Schools, 39*, 203-207.

Keysers, C. & Fadiga, L. (2008). The mirror neuron system: New frontiers. *Social Neuroscience, 3*(3-4), 193-198. Doi:10.1080/17470910802408513.

Keysers, C. & Gazzola, V. (2014). Hebbian learning and predictive mirror neurons for actions, sensations and emotions. *Philosophical Transactions of the Royal Society of London, Series B, Biological Sciences, 369*(1644), 20130175. Doi:10.1098/rstb.2013.0175.

Klin, A. (2006). Autism and Asperger syndrome: an overview. *Brazilian Journal of Psychiatry, 28,* 1. Retrieved from http://dx.doi.org/10.1590/S1516-44462006000500002

Klin, A., Saulnier, C., Tsatsanis, K. & Volkmar, F. (2005). Clinical evaluation in autism spectrum disorders: psychological assessment within a transdisciplinary framework. In: F. Volkmar, R. Paul, A. Klin, D. Cohen (Eds.). *Handbook of autism and pervasive developmental disorders* (pp.272-98). 3rd ed. New York, NY: Wiley.

Kloo D., Perner, J., & Gritzer, T. (2010). Object-based set-shifting in preschoolers: Relations to Theory of Mind. In B. W. Sokol, U. Müller, J. I. M. Carpendale, A. R. Young, & G. Iarocci (Eds.), *Self and social regulation: Social interaction and the development of social understanding and executive functions* (pp. 193-217). New York, NY: Oxford University Press.

Koegel, R. L., Koegel, L. K. & Carter, C. M. (1999). Pivotal teaching interactions for children with autism. *School Psychology Review, 28*(4), 576-594. Retrieved from https://www.researchgate.net/publication/232492573_Pivotal_teaching_interactions_for_children_with_autism.

Koegel, R., Kim, S., Koegel, L. & Schwartzman, B. (2013). Improving socialization for high school students with ASD by using their preferred interests. *Journal of Autism and Developmental Disorders, 43*(9), 2121-2134. Doi:10.1007/s10803-013-1765-3

Koldewyn, K., Jiang, Y., Weigelt, S. & Kanwisher, N. (2013). Global/local processing in autism: not a disability, but a disinclination. *Journal of Autism and Developmental Disorders, 43*(10), 2329-2340. Doi:10.1007/s10803-013-1777-z

Komeda, H., Osanai, H., Yanaoka, K., Okamoto, Y., Fujioka, T., Arai, S. …Kosaka, H. (2016). Decision making processes based on social conventional rules in early adolescents with and without autism spectrum disorders. *Scientific Reports, 6*(37875). Retrieved from https://doi.org/10.1038/srep37875.

Korkmaz, B. (2011). Theory of mind and neurodevelopmental disorders of childhood. *Pediatric Research, 69*(5), 101R–108R. Retrieved from https://www.nature.com/articles/pr92011100.

Krasny, L., Williams, B. J., Provencal, S., & Ozonoff, S. (2003). Social skills interventions for the autism spectrum: essential ingredients and a model curriculum. *Child and Adolescent Psychiatric Clinics of North America, 12*(1), 107-22. Doi:10.1016/S1056-4993(02)00051-2.

Kroeger, K. A. Schultz, J. R. & Newsom, C. (2007). A comparison of two group-delivered social skills programs for young children with autism. *Journal of Autism and Developmental Disorders, 37*(5), 808-17. Doi:10.1007/s10803-006-0207-x

Kuo, M. H., Orsmond, G. I., Coster, W. J., & Cohn, E. S. (2014). Media use among adolescents with autism spectrum disorder. Autism, 18(8), 914-923. Retrieved from https://doi.org/10.1177/1362361313497832.

Kushner E. S., Bennetto, L. & Yost, K. (2007). Patterns of nonverbal cognitive functioning in young children with autism spectrum disorders. *Journal of Autism and Developmental Disorders, 37*(5): 795-807. Doi: 10.1007/s10803-006-0209-8.

Laugeson, E. A., Frankel, F., Mogil, C. & Drillon, A. R. (2009). Parent-assisted social skills training to improve friendships in teens with autism spectrum disorders. *Journal of Autism and Developmental Disorders, 39*(4), 596-606. Doi:10.1007/s10803-008-0664-5. Doi: 10.1007/s10803-008-0664-5.

Lang, R., Shogren, K. A., Machalicek, W., Rispoli, M., O'Reilly, M., Baker, S. & Regester, A. (2009). Video self-modeling to teach classroom rules to two students with asperger's. *Research in Autism Spectrum Disorders, 3,* 483-488.

Laver, K. & Wilkes-Gillan, S. (2018). Video modelling interventions improve social communication skills for individuals with autism spectrum disorder. *Australian Occupational Therapy Journal, 65*(4), 340-341. Doi:10.1111/1440-1630.12505.

LeBlanc, L. A., Coates, A. M., Daneshvar, S., Charlop-Christy, M. H., Morris, C., & Lancaster, B. (2003). Using video modeling and reinforcement to teach perspective-taking skills to children with autism. *Journal of Applied Behavior Analysis, 36*(2), 253–257. Doi:10.1901/jaba.2003.36-253.

Lecavalier, L., Leone, S. & Wiltz, J. (2006). The impact of behaviour problems on caregiver stress in young people with autism spectrum disorders. *Journal of Intellectual Disability Research, 50*(3), 172-183. Doi:10.1111/j.1365-2788.2005.00732.x.

Lecce, S., Bianco, F., Devine, R. & Hughes, C. (2017). Relations between theory of mind and executive function in middle childhood: a short-term longitudinal study. *Journal of Experimental Child Psychology, 163*, 69-86. Retrieved from https://doi.org/10.1016/j.jecp.2017.06.011.

Ledford, J. R., Gast, D. L., Luscre, D. & Ayres, K. M. (2008). Observational and incidental learning by children with autism during small group instruction. *Journal of Autism and Developmental Disorders, 38*(1), 86-103. Doi:10.1007/s10803-007-0363-7.

Lee, S. Y., Lo, Y., & Lo, Y. (2017). Teaching functional play skills to a young child with autism spectrum disorder through video self-modeling. *Journal of Autism and Developmental Disorders, 47*(8), 2295-2306. Retrieved from https://doi.org/10.1007/s10803-017-3147-8.

Leekam, S. R. & Ramsden, C. A. (2006). Dyadic orienting and joint attention in preschool children with autism. *Journal of Autism and Developmental Disorders, 36*(2), 185-97. Doi:10.1007/s10803-005-0054-1.

Lemmon, K. H. & Green, V. A. (2015). Using video self-modeling and peer group to increase the social skills of a preschool child. *New Zealand Journal of Psychology, 44*(2), 68-78. Retrieved from https://www.psychology.org.nz/wp-content/uploads/72176-NZJP-Vol-44-No-2_Video-Self-Modelling.pdf

Levin, I. P., Gaeth, G. J., Foley-Nicpon, M., Yegorova, V., Cederberg, C., & Yan, H. (2015).

Extending decision making competence to special populations: a pilot study of persons on the autism spectrum. *Frontiers in Psychology, 6*, 539. Doi:10.3389/fpsyg.2015.00539

Levinson, S. (2006). *Cognition at the heart of human interaction*. Retrieved from https://doi.org/10.1177%2F1461445606059557.

Liszkowski, U. (2011). Three lines in the emergence of prelinguistic communication and social cognition. *Journal of Cognitive Education and Psychology, 10*(1), 32-43. Retrieved from https://pure.mpg.de/rest/items/item_446297_7/component/file_733568/content

Litras, S., Moore, D. & Anderson, A. (2010). Using video self-modelled social stories to teach social skills to a young child with autism. *Autism Research and Treatment.* Doi:10.1155/2010/834979

Little, W. (2016). Social interaction: Micro-level interaction. In *Introduction to sociology* (2nd Canadian Edition). Victoria, BC: BC Campus. Retrieved from https://opentextbc.ca/introductiontosociology2ndedition/chapter/chapter-22-social-interaction/

Lodhia, V., Suk, CJ., Lim, V., Hamm, JP. & Kirk, I.J. (2017). Decreased interhemispheric time transfer of visual information in adults with autistic spectrum disorder using the Poffenberger paradigm. *Research in Autism Spectrum Disorders, 43-44*, 76-86. Retrieved from https://doi.org/10.1016/j.rasd.2017.09.003

Lopata, C., Volker, M. A., Putnam, S. K., Thomeer, M. L. & Nida, R. E. (2008). Effect of social familiarity on salivary cortisol and self-reports of social anxiety and stress in children with high functioning autism spectrum disorders. *Journal of Autism and Developmental Disorders, 38*(10), 1866-1877. Doi:10.1007/s10803-008-0575-5.

Lord, C. & Bishop, S. L. (2015). Recent advances in autism research as reflected in DSM-5 criteria for autism spectrum disorder. *Annual Review of Clinical Psychology, 11*, 53-

70. Doi:10.1146/annurev-clinpsy-032814-112745.

Lord, C. & MaGill-Evans, J. (1995). Peer interactions of autistic children and adolescents. *Development and Psychopathology, 7*(4; Developmental Processes in Peer Relations and Psychopathology), 611-626. Retrieved from https://www.cambridge.org/core/journals/development-and-psychopathology/article/peer-interactions-of-autistic-children-and-adolescents/AE353070F2B761AB404B6D1E547CB2C8

Losh, M. & Capps, L. (2006). Understanding of emotional experience in autism: Insights from personal accounts of high functioning children with autism. *Developmental Psychology, 42*(5), 809-818. Doi:10.1037/0012-1649.42.5.809.

Loucas, T., Charman, T., Pickles, A., Simonoff, E., Chandler, S., Meldrum, D. & Baird, G. (2008). Autistic symptomatology and language ability in autism spectrum disorders and specific language impairment. *Journal of Child Psychology and Psychiatry, 49*(11), 1184-92. Doi:10.1111/j.1469-7610.2008.01951.x.

Loukusa, S., Leinonen, E., Kuusikko, S., Jussila, K., Mattila, M. L., Ryder, N. … Moilanen, I. (2007). Use of context in pragmatic language comprehension by children with Asperger syndrome or high-functioning autism. *Journal of Autism and Developmental Disorders, 37*(6), 1049-59. Doi:10.1007/s10803-006-0247-2.

Lucariello, J., Durand, T. & Yarnell, L. (2007). Social versus intrapersonal ToM: Social ToM is a cognitive strength for low- and middle- SES children. *Journal of Applied Developmental Psychology, 28*(4), 285-297. Retrieved from https://doi.org/10.1016/j.appdev.2007.04.001.

Ma, H. H. (2006). An alternative method for quantitative synthesis of single-subject researches: Percentage of data points exceeding the median. *Behaviour Modification, 30*(5), 598-617. Retrieved from http://www.hdfs.ntnu.edu.tw/en/files/news/146_fe84e647.pdf

MacDonald, R., Clark, M., Garrigan, E. & Vangala, M. (2005). Using video modeling to teach pretend play to children with autism. *Behavioral Interventions, 20*(4), 225-238. Doi:10.1002/bin.197.

MacMullin, J., Lunsky, Y., & Weiss, J. (2016). Plugged in: Electronics use in youth and young adults with autism spectrum disorder. *Autism, 20*(1), 45-54. Doi:10.1177/1362361314566047.

Maglione, M. A., Gans, D., Das, L., Timbie, J., Kasari, C., For the Technical Expert Panel, HRSA Autism Intervention Research – Behavioral (AIR-B) Network, (2012). Nonmedical Interventions for Children With ASD: Recommended Guidelines and Further Research Needs. *Pediatrics, 130*(Supplement 2), S169-S178. Doi:10.1542/peds.2012-0900O

Maione, L. & Mirenda, P. (2006). Effects of video modeling and video feedback on peer-directed social language skills of a child with autism. *Journal of Positive Behavior Interventions, 8*(2), 106-118. Retrieved from https://doi.org/10.1177/10983007060080020201.

Maljaars, J., Noens, I., Jansen, R., Scholte, E., & van Berckelaer-Onnes, I. (2011). Intentional communication in nonverbal and verbal low-functioning children with autism. *Journal or Communication Disorders, 44*(6), 601-14. Doi:10.1016/j.jcomdis.2011.07.004.

Malle, B. F. (2005). Three puzzles of mindreading. In: B. F. Malle & S. D. Hodges (Eds.), *Other minds: How humans bridge the divide between self and others* (pp. 26–43). New York, NY: The Guilford Press.

Mandell, D., Novak, M. & Zubritsky, C. (2005). Factors associated with age of diagnosis among children with autism spectrum disorders. *Pediatrics, 116*(6), 1480-1486. Doi:10.1542/peds.2005-0185.

Marcus, L, Schopler, E., & Lord, C. (2000). TEACCH services for preschool children. In J. S. Handleman & S. L. Harris (Eds.), *Preschool education programs for children with*

autism (2nd ed., pp. 215–232). Austin, TX: PRO-ED.

Marcus, A. & Wilder, D. A. (2009). A comparison of peer video modeling and self video modeling to teach textual responses in children with autism. *Journal of Applied Behavior Analysis, 42*(2), 335–341. Doi:10.1901/jaba.2009.42-335

Martinez, L., Falvello, V., Aviezer, H., & Todorov, A. (2015). Contributions of facial expressions and body language to the rapid perception of dynamic emotions. *Cognition and Emotion, 11*(15), 1-14. Doi:10.1080/02699931.2015.1035229.

Marvin, A., Marvin, D., Lipkin, P. & Law K. (2017). Analysis of social communication questionnaire (SCQ) screening for children less than age 4. *Current Developmental Disorders Reports, 4*(4), 137-144. Retrieved from https://doi.org/10.1007/s40474-017-0122-1.

Mason, R. A., Davis, H. S., Ayres, K., Davis, J. L., & Mason, B. A. (2016). Video self-modeling for individuals with disabilities: A best-evidence, single case meta-analysis. *Journal of Developmental and Physical Disabilities, 28*(4). Doi:10.1007/s10882-016-9484-2

Matthews, D. (Ed.). (2014). *Pragmatic development in first language acquisition*. Philadelphia, PA: John Benjamins Publishing Company.

Maurer, D., Le Grand, R. & Mondloch, C. J. (2002). The many faces of configural processing. *Trends in Cognitive Sciences, 6*(6), 255–260. Retrieved from https://doi.org/10.1016/S1364-6613(02)01903-4.

Mayes, S.D. & Calhoun, S.L. (2007). Learning, attention, writing, and processing speed in typical children and children with ADHD, autism, anxiety, depression, and oppositional-defiant disorder. *Child Neuropsychology, 6*(13), 469-493. Retrieved from http://dx.doi.org/10.1080/09297040601112773

Maynard, D. & Peräkaylä, A. (2003). Language and social interaction. In: J. Delamater (Ed.), *Handbook of social psychology* (pp. 233-257). New York: Kluwer Academic/Plenum

Publishers.

Mazurek, M. O., Shattuck, P. T., Wagner, M. & Copper, B. P. (2012). Prevalence and correlates of screen-based media use among youths with autism spectrum disorders. *Journal of Autism and Developmental Disorders, 42*(8), 1757–1767. Doi:10.1007/s10803-011-1413-8.

Mazurek, M. & Engelhardt, C. R. (2013). Video game use and problem behaviors in boys with autism spectrum disorders. *Research in Autism Spectrum Disorders, 7*(2), 316–324. Doi:10.1016/j.rasd.2012.09.008.

Mazurek, M. O. & Wenstrup, C. (2013). Television, video game and social media use among children with ASD and typically developing siblings. *Journal of Autism and Developmental Disorders, 43*(6), 1258-71. Doi:10.1007/s10803-012-1659-9.

McCoy, K., & Hermansen, E. (2007). Video modeling for individuals with autism: a review of model types and effects. *Education and Treatment of Children, 30*(4), 183–213. Doi:10.1353/etc.2007.0029.

McEvoy, R., Rogers, S. & Pennington B. (1993). Executive function and social communication deficits in young autistic children. *Journal of Child Psychology and Psychiatry*, 34(4), 563-578. Retrieved from http://onlinelibrary.wiley.com/doi/10.1111/j.1469-7610.1993.tb01036.x/pdf

McFee, K. (2010). *Teaching social skills to children with Asperger's and high functioning autism: An evaluation of video self-modeling and behavior skills training* (Master's Thesis). University of South Florida, Tampa, FL. Retrieved from http://scholarcommons.usf.edu/etd/3633.

McGee, G. G., Krantz, P. J., Mason, D. & McClannahan, L. E. (1983). A modified incidental-teaching procedure for autistic youth: acquisition and generalization of receptive object labels. *Journal of Applied Behavior Analysis, 16*(3), 329-38. Doi:10.1901/jaba.1983.16-329.

McHugh, M. (2012). Interrater reliability: The kappa statistic. *Biochemia Medica, 22*(3), 276-82. Doi:10.11613/BM.2012.031.

McKone, E., Kanwasher, N. & Duchaine, B. C. (2007). Can generic expertise explain special processing for faces? *Trends in Cognitive Sciences, 11*(1), 8–15. Retrieved from https://doi.org/10.1016/j.tics.2006.11.002

McLeod, S.A. (2016). *Bandura – Social learning theory*. Retrieved from www.simplypsychology.org/bandura.html

McReynolds, L.V. & Thompson, C.K. (1986). Flexibility of single-subject experimental designs. part 1: review of the basics of single-subject designs. *Journal of Speech and Hearing Disorders, 51,* 194-203. Retrieved from https://www.researchgate.net/profile/Cynthia_Thompson2/publication/19635907_Flexibility_of_single-subject_experimental_designs_Part_I_Review_of_the_basics_of_single-subject_designs/links/09e4150a53a516df66000000/Flexibility-of-single-subject-experimental-designs-Part-I-Review-of-the-basics-of-single-subject-designs.pdf

Mehtar, M. & Mukaddes, N. M. (2011). Posttraumatic stress disorder in individuals with diagnosis of autism spectrum disorders. *Research in Autism Spectrum Disorders, 5*(1), 539-546. Doi:10.1016/j.rasd.2010.06.020.

Meinhardt-Injac, B., Daum, M., Meinhardt, G. & Periske, M. (2018). The two-systems account of theory of mind: Testing the links to social-perceptual and cognitive abilities. *Frontiers in Human Neuroscience*. Retrieved from https://doi.org/10.3389/fnhum.2018.00025.

Meltzoff, A. N. & Decety, J. (2003). What imitation tells us about social cognition: a rapprochement between developmental psychology and cognitive neuroscience. *Philosophical Transactions of the Royal Society, Series B, Biological Sciences, 358*(1431), 491–500. Doi:10.1098/rstb.2002.1261.

Meltzoff, A. N., Kuhl, P. K., Movellan, J. & Sejnowski, T. (2009). Foundations for a new science of learning. *Science, 325*(5938), 284–288. Doi:10.1126/science.1175626

Menickelli, J. Landin, D., Grisham, W, & Herbert, E. P. (2000). The effects of videotape feedback with augmented cues on the performance and thought processes of skilled gymnasts. *Journal of Sport Pedagogy, 6*(1), 56-72. Retrieved from https://www.researchgate.net/publication/301232212_The_Effects_of_Videotaped_Feedback_with_Augmented_Cues_on_the_Performance_and_Thought_Processes_of_Skilled_Gymnasts.

Miller, S. A. (2009). Children's understanding of second-order mental states. *Psychological Bulletin, 135*(5), 749-73. Doi:10.1037/a0016854

Miniscalco, C., Rudling, M., Råstam, M., Gillberg, C., & Johnels, J. A. (2014). Imitation (rather than core language) predicts pragmatic development in young children with ASD: a preliminary longitudinal study using CDI parental reports. *International Journal of Language and Communication Disorders, 49*(3), 369-75. Doi:10.1111/1460-6984.12085.

Ministries of Health and Education (2016). *New Zealand Autism Spectrum Disorder Guideline*. Wellington: Ministry of Health. Retrieved from https://www.health.govt.nz/publication/new-zealand-autism-spectrum-disorder-guideline.

Mitchell, J. P. (2005). Mentalizing and Marr: An information processing approach to the study of social cognition. *Brain Research, 1079*(1), 66–75. Retrieved from https://doi.org/10.1016/j.brainres.2005.12.113

Mitchell, R. L. C. & Phillips, L. H. (2015). The overlapping relationship between emotion perception and theory of mind. *Neuropsychologia, 70*, 1–10. Retrieved from https://doi.org/10.1016/j.neuropsychologia.2015.02.018

Mody, M. & Belliveau, J. (2013). Speech and language impairments in autism: Insights from

behaviour and neuroimaging. *North American Journal of Medicine and Science (Boston), 5*(3), 157-161. Retrieved from http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3862077/#_ffn_sectitle

Molenberghs, P., Johnson, H., Henry, J. D. & Mattingley, J. B. (2016). Understanding the minds of others: A neuroimaging meta-analysis. *Neuroscience & Biobehavioral Reviews, 65*, 276–291. Retrieved from https://doi.org/10.1016/j.neubiorev.2016.03.020.

Montes G. & Cianca, M. (2014). Family Burden of Raising a Child with ASD. In V. Patel, V. Preedy & C. Martin (Eds.). *Comprehensive guide to autism*. New York, NY: Springer. Retrieved from https://doi.org/10.1007/978-1-4614-4788-7_4.

Montes, G. & Halterman J. S. (2007). Psychological functioning and coping among mothers of children with autism: a population-based study. *Pediatrics, 119*(5), e1040-6. Doi:10.1542/peds.2006-2819.

Moody, E., Reyes, N., Ledbetter, C., Wiggins, L., DiGuiseppi, C., Alexander, A. & Rosenberg, S. (2017). Screening for autism with SRS and SCQ: Variations across demographic, developmental and behavioral factors in preschool children. *Journal of Autism and Developmental Disorders, 47*(11), 3550-3561. Doi:10.1007/s10803-017-3255-5.

Morgan, D.L. and Morgan, R.K. (2009). Multiple-baseline designs. *Single-case Research Methods for the Behavioural and Health Sciences*, (pp. 125-160). USA: Sage Publications Inc.

Murdock, L. C. & Hobbs, J. Q. (2011). Tell me what you did today: A visual cueing strategy for children with ASD. *Focus on Autism and Other Developmental Disabilities, 26*(3), 162-172. Retrieved from https://doi.org/10.1177/1088357611405191.

National Research Council (2001). *Educating Children with Autism*. Washington, DC: The National Academies Press. Retrieved from https://doi.org/10.17226/10017.

Naber, F. B. A., Swinkels, S. H. N., Buitelaar, J. K., Dietz, C., van Daalen, E., Bakermans-Kranenburg, M. J. … van England, E. (2007). Joint attention and attachment in toddlers with autism. *Journal of Abnormal Child Psychology, 35*(6), 899-911. Doi:10.1007/s10802-007-9142-3.

Nadel, J. (2015). Perception-action coupling and imitation in autism spectrum disorder. *Developmental Medicine and Child Neurology, 57*(Suppl 2), 55-8. Doi:10.1111/dmcn.12689.

Neitzel, J. (2009). *Overview of antecedent-based interventions*. Chapel Hill, NC: The National Professional Development Center on Autism Spectrum Disorders, Frank Porter Graham Child Development Institute, The University of North Carolina.

Nikopoulos, C. & Keenan, M. (2003). Promoting social initiations in children with autism using video modeling. *Behavioural Interventions*, 18, 87 – 108. Retrieved from https://pdfs.semanticscholar.org/08d5/35afbfd1cc7be295a602f187c472d143f640.pdf

Nikopoulos, C. K. & Keenan, M. (2007). Using video modeling to teach complex social sequences to children with autism. *Journal of Autism and Developmental Disorders, 37*(4), 678-93. Doi:10.1007/s10803-006-0195-x.

Niznikiewicz, M. (2013). The building blocks of social communication. *Advances in Cognitive Psychology, 9*(4), 173-183. Doi:10.2478/v10053-008-0145-6.

Nock, M. K., Michel, B. D. & Photos, V. I. (2008). Single-case research design. In D. McKay (Ed.), *Handbook of Research Methods in Abnormal and Clinical Psychology* (pp. 337-350). Thousand Oaks, CA; Sage Publications, Inc.

Northoff, G., Heinzel, A., de Greck, M., Bermpohl, F., Dobrowolny, H. & Panksepp, J. (2006). Self-referential processing in our brain - a meta-analysis of imaging studies on the self. *Neuroimage, 31*(1), 440-57. Doi:10.1016/j.neuroimage.2005.12.002.

O'Connor, K. (2011). Auditory processing in autism spectrum disorder: A review. *Neuroscience and Biobehavioral Reviews, 36*(2), 836-854. Retrieved from

https://doi.org/10.1016/j.neubiorev.2011.11.008

O'Riordan, M.A., Plaisted, K.C., Driver, J. & Baron-Cohen, S. (2001). Superior visual search in autism. *Journal of Experimental Psychology: Human Perception and Performance, 27*(3), 719-730. Retrieved from http://dx.doi.org/10.1037/0096-1523.27.3.719

Oberman, L., Ramachandran, V. S. & Pineda, J. A. (2008). Modulation of mu suppression in children with autism spectrum disorders in response to familiar or unfamiliar stimuli: the mirror neuron hypothesis. *Neuropsychologia, 46*(5), 1558-65. Doi:10.1016/j.neuropsychologia.2008.01.010

Odom, S. L., Boyd, B. A., Hall, L. J. & Hume, K. (2010). Evaluation of comprehensive treatment models for individuals with autism spectrum disorders. *Journal of Autism and Developmental Disorders, 40*(4), 425-36. Doi:10.1007/s10803-009-0825-1.

Ogawa, S., Lee, Y., Yamaguchi, Y., Shibata, Y & Goto, Y. (2016). Associations of acute and chronic stress hormones with cognitive functions in autism spectrum disorder. *Neuroscience, 343*, 229-239. Retrieved from https://doi.org/10.1016/j.neuroscience.2016.12.003.

Ogle, L. N. (2012). *A comparison of point of view modeling and video self-modeling for preschool-aged children with autism spectrum disorder*. (Unpublished Master's Thesis). The University of Tennessee at Chattanooga. Chattanooga, Tennessee, USA. Retrieved from https://core.ac.uk › download › pdf

Olive, M.L. & Franco, J.H. (2008). (Effect) size matters: and so does calculation. *The Behavior Analyst Today, 9*(1), 5-10. Retrieved from http://dx.doi.org/10.1037/h0100642.

Onishi, K. H. & Baillargeon, R. (2005). Do 15-month-old infants understand false beliefs*?* *Science, 308*(5719), 255-258. Doi:10.1126/science.1107621.

Ooi, K, Ong, Y. S., Jacob, S. A., & Khan, T. M. (2016). A meta-synthesis on parenting a child with autism. *Neuropsychiatric Disease and Treatment, 12*, 745-762. Retrieved

from https://doi.org/10.2147/NDT.S100634.

Osbourne, L. A., McHugh, L., Saunders, J. & Reed, P. (2008). Parenting stress reduces the effectiveness of early teaching interventions for autistic spectrum disorders. *Journal of Autism and Developmental Disorders, 38*(6), 1092-103. Doi:10.1007/s10803-007-0497-7.

Osterling, J. & Dawson, G. (1994). Early recognition of children with autism: a study of first birthday home videotapes. *Journal of Autism and Developmental Disorders, 24*(3), 247-57. Retrieved from https://www.ncbi.nlm.nih.gov/pubmed/8050980/

Otto-Meyer, S., Krizman, J., White-Schwoch, T. & Kraus, N. (2018). Children with autism spectrum disorder have unstable neural responses to sound. *Experimental Brain Research, 236*(3), 733-743. Doi:10.1007/s00221-017-5164-4.

Ozerk, M. & Ozerk, K. (2015). A bilingual child learns social communication skills through video modelling – a single case study in a Norweigan school setting. *International Electronic Journal of Elementary Education, 8*(1), 551-556. Retrieved from https://iejee.com/index.php/IEJEE/article/download/99/96

Ozkan, S. (2013). Comparison of peer and self-video modeling in teaching first aid skills to children with intellectual disability. *Education and Training in Autism and Developmental Disabilities, 48*(1), 88-102. Retrieved from http://daddcec.org/Portals/0/CEC/Autism_Disabilities/Research/Publications/Education_Training_Development_Disabilities/ETADD_48(1)_88-102.pdf

Ozonoff, S., Pennington, B., & Rogers, S. (1991). Executive function deficits in high-functioning autistic individuals: Relationship to theory of mind. *Journal of Child Psychology and Psychiatry, 32*(7), 1081-1105 1991. Retrieved from https://www.du.edu/ahss//psychology/dnrl/media/documents/Executive%20function%20deficits%20in

Ozonoff, S., Young, G. S., Carter, A., Messinger, D., Yirmiya, N, Zwaigenbaum, L. … Stone,

W. L. (2011). Recurrence risk for autism spectrum disorders: A baby siblings research consortium study. *Pediatrics, 128*(3), e488-95. Doi:10.1542/peds.2010-2825

Ozsivadijan, A., Knott, F. & Magiati, I. (2012). Parent and child perspectives on the nature of anxiety in children and young people with autism spectrum disorders: A focus group study. *Autism. 16*(2), 107-21. Doi:10.1177/1362361311431703

Park, J., & Lee, J. (2015). Dyadic collaboration among preschool-age children and the benefits of working with a more socially advanced peer. *Early Education and Development, 26*(4), 574–593. Doi:10.1080/10409289.2015.995567

Parker, R., Vannest, K. & Davis, J. (2011). Effect size in single-case research: A review of nine overlap techniques. *Behaviour Modification, 35*:303. Doi:10.1177/0145445511399147.

Parsons, L., Cordier, R., Munro, N., Joosten, A. & Speyer R. (2017). A systematic review of pragmatic language interventions for children with autism spectrum disorder. *PLoS One 12*(4), e0172242. Retrieved from https://doi.org/10.1371/journal. pone.0172242

Patten, E., Belardi, K., Baranek, G., Watson, L. R., Labban, J. D. & Oller D. K. (2014). Vocal patterns in infants with autism spectrum disorder: canonical babbling status and vocalization frequency. *Journal of Autism and Developmental Disorders, 44*(10), 2413-2428. Doi:10.1007/s10803-014-2047-4.

Patten, E. & Watson, L. (2011). Interventions targeting attention in young children with autism. *American Journal of Speech-Language Pathology, 20*(1), 60-9. Doi:10.1044/1058-0360(2010/09-0081).

Paul, R. (2008). Interventions to improve communication. *Child and Adolescent Psychiatric Clinics of North America, 17*(4), 835-x. Doi:10.1016/j.chc.2008.06.011.

Paul, R. & Cohen, J. (1984). Outcomes of severe disorders of language acquisition. *Journal of Autism and Developmental Disorders, 14*(4), 405-21. Retrieved from https://www.ncbi.nlm.nih.gov/pubmed/6084003.

Paul, R., Chawarska, K., Cicchetti, D. & Volkmar, F. (2008). Language outcomes of toddlers with autism spectrum disorders: A two-year follow-up. *Autism Research, 1*(2), 97–107. Doi:10.1002/aur.12.

Pellicano, E. (2007). Links between theory of mind and executive function in young children with autism: clues to developmental primacy. *Developmental Psychology, 43*(4,: 974-990. Doi:10.1037/0012-1649.43.4.974.

Peppé, S., McCann, J., Gibbon, F., O'Hare, A., & Rutherford, M. (2006). Assessing prosodic and pragmatic ability in children with high-functioning autism. *Journal of Pragmatics, 38*(10), 1776-1791. Doi:10.1016/j.pragma.2005.07.004

Petrosini, L. (2007). "Do what I do" and "do how I do": Different components of imitative learning are mediated by different neural structures. *Neuroscientist, 13*(4), 335-348. Doi:10.1177/10738584070130040701

Petryszak, N. (1979). The biosociology of the social self. *The Sociological Quarterly, 20,* 291-303. Retrieved from https://www.jstor.org/stable/4106203?seq=1#page_scan_tab_contents

Pickles, A., Le Couteur, A., Leadbitter, K., Salomone, E., Cole-Fletcher, R., Tobin, H. … Green, J. (2016). Parent-mediated social communication therapy for young children with autism (PACT): long-term follow-up of a randomised controlled trial. *The Lancet, 2016*. Doi:10.1016/S0140-6736(16)31229-6.

Pierce, K., Gazestani, V. H., Bacon, E., Barnes, C. C., Cha, D., Nalabolu, S. … Courchesne, E. (2019). Evaluation of the diagnostic stability of the early autism spectrum disorder phenotype in the general population starting at 12 months. *JAMA Pediatrics, 173*(6), 578–587. Doi:10.1001/jamapediatrics.2019.0624.

Pisula, E. & Kossakowska, Z. (2010). Sense of coherence and coping with stress among mothers and fathers of children with autism. *Journal of Autism and Developmental Disorders, 40*(12), 1485-94. Doi: 10.1007/s10803-010-1001-3.

Plaisted, K., Saksida, L., Alcantara, J., & Weisblatt, E. (2003). Towards an understanding of the mechanisms of weak central coherence effects: experiments in visual configural learning and auditory perception. *Philosophical Transactions of the Royal Society of London, Series B, Biological Sciences, 358*(1430), 375-86. Doi:10.1098/rstb.2002.1211.

Portney, L. & Watkins, M. (2008). *Foundations of clinical research: Applications to practice* (3rd ed.). Upper Saddle, NJ: Pearson Prentice Hall.

Pratt, C. & Steward, L. (2018). *Discrete trial training: What is it?* Retrieved from https://www.iidc.indiana.edu/pages/discrete-trial-teaching-what-is-it

Preissler, M. A. (2008). Associative learning of pictures and words by low functioning children with autism. *Autism, 12,* 231. Doi:10.1177/1362361307088753.

Preston, D. & Carter, M. (2009). A review of the efficacy of the picture exchange communication system intervention. *Journal of Autism and Developmental Disorders, 39*(10), 1471-1486. Doi:10.1007/s10803-009-0763-y.

Prizant, B. M., Wetherby, A. M., Rubin, E., & Laurent, A. C. (2003). The SCERTS model: a transactional, family-centered approach to enhancing communication and socioemotional abilities of children with autism spectrum disorder. *Infants and Young Children, 16*(4), 296–316. Retrieved from https://journals.lww.com/iycjournal/fulltext/2003/10000/the_scerts_model__a_transactional,_family_centered.4.aspx.

Quill, K. (1997). Instructional considerations for young children with autism: The rationale for visually cued instruction. *Journal of Autism and Developmental Disorders, 27*(6), 697-714. Retrieved from https://link.springer.com/article/10.1023/A:1025806900162

Quill, K. (2000). *Do-Watch-Listen-Say*. Baltimore, MD: Paul H. Brooks Publishing Co.

Quimbach, L. M., Lincoln, A. J., Feinberg-Gizzo, M. J., Ingersoll, B. R. & Andrews, S. M. (2009). Social stories: mechanisms of effectiveness in increasing game play skills in

children diagnosed with autism spectrum disorder using a pretest posttest repeated measures randomized control group design. *Journal of Autism and Developmental Disorders, 39*(2), 299-321. Doi:10.1007/s10803-008-0628-9.

Qureshi, A. W., Apperly, I. A. & Samson, D. (2010). Executive function is necessary for perspective selection, not level-1 visual perspective calculation: evidence from a dual-task study of adults. *Cognition, 117*(2), 230-6. Doi:10.1016/j.cognition.2010.08.003.

Research New Zealand (2015). A report on a survey of New Zealanders' use of smartphones and other mobile communication devices 2015. *Research New Zealand*. Retrieved from http://www.researchnz.com/pdf/Special%20Reports/Research%20New%20Zealand%20Special%20Report%20-%20Use%20of%20Smartphones.pdf

Rilling, J. K. & Sanfey, A. G. (2011). The neuroscience of social decision-making. *Annual Review of Psychology, 62*, 23-48. Doi:10.1146/annurev.psych.121208.131647

Rizzolatti, G., Fadiga, L., Fogassi, L., & Gallese, V. (2002). From mirror neurons to imitation: Facts and speculations. In A. N. Meltzoff & W. Prinz (Eds.), Cambridge studies in cognitive perceptual development. *The imitative mind: Development, evolution, and brain bases* (pp. 247-266). New York, NY: Cambridge University Press.http://dx.doi.org/10.1017/CBO9780511489969.015

Rizzolatti, G., Fogassi, L. & Gallese, V. (2006). Mirrors in the mind. *Scientific American, 295*(2), 54-61. Retrieved from https://www.scientificamerican.com › article › mirrors-in-the-mind.

Rizzolatti, G. & Sinigaglia, C. (2010). The functional role of the parieto-frontal mirror circuit: interpretations and misinterpretations. *Nature Reviews Neuroscience, 11*(4), 264–274. Retrieved from http://dx.doi.org/10.1038/nrn2805.

Rogers, S. J., Hall, T., Osaki, D., Reaven, J., & Herbison, J. (2000). A comprehensive, integrated, educational approach to young children with autism and their families. In

S. L. Harris & J. S. Handleman (Eds.), *Preschool education programs for children with autism* (2nd ed.). Austin, TX: Pro-Ed.

Root, M. M. (2017, May). *Simple ways video self-modeling can help your ASD child. Autism Parenting Magazine, 62*. Retrieved from https://www.autismparentingmagazine.com/video-self-modeling-helps-asd/

Roser, M., Asilin, R., McKenzie, R., Zahra, D., & Fiser, J. (2015). Enhanced visual statistical learning in adults with autism. *Neuropsychology*, 29(2), 163-172. Retreived from http://dx.doi.org/10.1037/neu0000137

Ruta, L., Fama, F. I., Bernava, G. M., Leonardi, E., Tartarisco, G., Falzone, A. …Chakrabarti, B. (2017). Reduced preference for social rewards in novel tablet based task in young children with autism spectrum disorders. *Scientific Reports, 7*(1), 3329. Doi:10.1038/s41598-017-03615-x

Ruta, L., Mugno, D., D'Arrigo, V. G., Vitiello, B., & Mazzone, L. (2010). Obsessive-compulsive traits in children and adolescents with Asperger syndrome. *European Child and Adolescent Psychiatry, 19*(1), 17-24. Doi:10.1007/s00787-009-0035-6.

Rutter, M., Bailey, A. & Lord, C. (2003). *The Social Communication Questionnaire - Manual*. Los Angeles: Western Psychological Services

Sansosti, F. & Powell-Smith, K. (2008). Using computer-presented social stories and video models to increase the social communication skills of children with high-functioning autism spectrum disorders. *Journal of Positive Behaviour Interventions, 10*(3), 162-178. Doi:10.1177/1098300708316259.

Schaefer, H. H., Sobell, M. B., & Sobell, L. C. (1972). Twelve month follow-up of hospitalized alcoholics given self-confrontation experiences by videotape. *Behavior Therapy, 3*(2), 283-285. Retrieved from http://dx.doi.org/10.1016/S0005-7894(72)80091-1.

Scherer, K. R. (1995). Expression of emotion in voice and music. *Journal of Voice, 9*(3), 235–

248. Retrieved from https://doi.org/10.1016/S0892-1997(05)80231-0

Schertz, H., Baker, C., Hurwitz, S., & Benner, L. (2011). Principles of early intervention reflected in toddler research in autism spectrum disorders. *Topics in Early Childhood Special Education, 31*(1), 4-21. Doi:10.1177/0271121410382460.

Schieve, L. A., Blumberg, S. J., Rice, C., Visser, S. N. & Boyle, C. (2007). The relationship between autism and parenting stress. *Pediatrics, 119*(Suppl 1), S114-21. Doi:10.1542/peds.2006-2089Q.

Schmidt, C. & Bonds-Raacke, J. (2013). The effects of video self-modeling on children with autism spectrum disorder. *International Journal of Special Education, 28*(1). Retrieved from http://files.eric.ed.gov/fulltext/EJ1023317.pdf

Schirmer, A. & Adolphs, R. (2017). Emotion perception from face, voice, and touch: comparisons and convergence. *Trends in Cognitive Science, 21*(3), 216–228. Doi:10.1016/j.tics.2017.01.001.

Schreibman, L., & Ingersoll, B. (2005). Behavioral Interventions to Promote Learning in Individuals with Autism. In F. R. Volkmar, R. Paul, A. Klin, & D. Cohen (Eds.), *Handbook of autism and pervasive developmental disorders: Assessment, interventions, and policy* (pp. 882-896). Hoboken, NJ, US: John Wiley & Sons Inc.

Schultz, R. T., Romanski, L. M. & Tsatsanis, K. (2000). Neurofunctional models of autistic disorder and Asperger syndrome: clues from neuroimaging. In A. Klin, F.R Volkmar & S.S Sparrow (Eds.). *Asperger Syndrome* (pp. 172-209). New York, NY: Guilford Press.

Scott, R. & Baillargeon, R. (2017). Early false belief understanding. *Trends in Cognitive Sciences, 21*(4): 237-249. Retrieved from https://doi.org/10.1016/j.tics.2017.01.012

Sen, N. & Sen, N (2019). Calculation of effect size in single-subject experimental studies: Examination of non-regression-based methods. *Journal of Measurement and Evaluation in Education and Psychology, 10*(1), 30-48. Doi:10.21031/epod.419625.

Shamay-Tsoory, S. G. (2011). The neural bases for empathy. *Neuroscientist, 17*(1), 18-24. Doi:10.1177/1073858410379268.

Shamay-Tsoory, S. G., Harari, H., Aharon-Peretz, J., & Levkovitz, Y. (2010). The role of the orbitofrontal cortex in affective theory of mind deficits in criminal offenders with psychopathic tendencies. *Cortex, 46*(5), 668-77. Doi:10.1016/j.cortex.2009.04.008.

Sherer, M., Pierce, K., Paredes, S., Kisacky, K., Ingersoll, B. & Schreibman, L. (2001). Enhancing conversation skills in children with autism via video technology: Which is better, "self" or "other" as a model? *Behaviour Modification, 25*(140). Doi:10.1177/0145445501251008

Shriberg, L. D., Paul, R., McSweeny, J. L., Klin, A. M., Cohen, D. J. & Volkmar, F. R. (2001). Speech and prosody characteristics of adolescents and adults with high-functioning autism and Asperger syndrome. *Journal of Speech, Language and Hearing Research, 44*(5), 1097-115. Doi:10.1044/1092-4388(2001/087).

Shukla-Mehta, S., Miller, T. & Callahan, K. (2010). Evaluating the effectiveness of video instruction on social and communication skills training for children with autism spectrum disorder: A review of the literature. *Focus on Autism and Other Developmental Disabilities, 25*(1), 23-36. Doi:10.1177/1088357609352901.

Sigman, M., Ruskin, E., Arbeile, S., Corona, R., Dissanayake, C., Espinosa, M. … Zeirhut, C. (1999). Continuity and change in the social competence of children with autism, down syndrome and developmental delays. *Monographs of the Society of Research in Child Development, 64*(1), 1-114. Retrieved from https://www.ncbi.nlm.nih.gov/pubmed/10412222

Singer, T. & Lamm, C. (2009). The social neuroscience of empathy. *Annals of the New York Academy of Sciences, 1156*, 81-96

Singer, T., Seymour, B., O'Doherty, J., Kaube, H., Dolan, R. J. & Frith, C. D. (2004). Empathy for pain involves the affective but not sensory components of pain. *Science,*

303(5561), 1157-1162. Doi:10.1126/science.1093535

Simmons, D. R., Robertson, A. E., McKay, L. S., Toal, E., McAleer, P., & Pollick, F. E. (2009). Vision in autism spectrum disorders. *Vision Research, 49*(22), 2705–2739. Doi:10.1016/j.visres.2009.08.005

Simonoff, E., Pickles, A., Charman, T., Chandler, S., Loucas, T. & Baird, G. (2008). Psychiatric disorders in children with autism spectrum disorders: prevalence, comorbidity, and associated factors in a population derived sample. *Journal of the American Academy of Child and Adolescent Psychiatry*, *47*(8), 921-929. Doi:10.1097/CHI.0b013e318179964f.

Simpson, A., Langone, J., & Ayres, K. M. (2004). Embedded video and computer based instruction to improve social skills for students with autism. *Education and Training in Developmental Disabilities, 39*(3), 240-252. Retrieved from https://www.researchgate.net/publication/256703142_Embedded_video_and_computer_based_instruction_to_improve_social_skills_for_students_with_autism.

Smith, J., Hand, L. & Dowrick, P. W. (2014). Video feedforward for rapid learning of a picture-based communication system. *Journal of Autism and Developmental Disabilities, 44*(4), 926-936. Retrieved from https://doi.org/10.1007/s10803-013-1946-0.

Smith, T., Groen, A. D., & Wynn, J. W. (2000). Randomized trial of intensive early intervention for children with pervasive developmental disorder. *American Journal on Mental Retardation, 105*(4), 269-285. Retrieved from http://dx.doi.org/10.1352/0895-8017(2000)105<0269:RTOIEI>2.0.CO;2.

Smith, T. & Iadarola, S. (2015). Evidence base update for autism spectrum disorder. *Journal of Clinical Child and Adolescent Psychology, 44*(6), 897-922. Doi:10.1080/15374416.2015.1077448.

Sng, C. Y., Carter, M. & Stephenson, J. (2018). A systematic review of the comparative

pragmatic differences in conversational skills of individuals with autism. *Autism and Developmental Language Impairments*. Retrieved from https://doi.org/10.1177/2396941518803806.

Sofronoff, K., Dark, E. & Stone, V. (2011). Social vulnerability and bullying in children and Asperger Syndrome. *Autism, 15*(3), 355-72. Doi:10.1177/1362361310365070.

South, M., Larson, M., White, S., Dana, J. & Crowley, M. J. (2011). Better fear conditioning is associated with reduced symptom severity in autism spectrum disorders. *Autism Research, 4*(6): 412-421. Retrieved from https://doi.org/10.1002/aur.221.

Spears, C. & Turner, V. (2011). Visual Supports. *Rising to New Heights of Communication and Learning for Children with Autism* (pp. 65-86). Philadelphia, PA: Jessica Kingsley Publishers.

Sperduti, M., Guionnet, S., Fossati, P. & Nadel, J. (2014). Mirror Neuron System and Mentalizing System connect during online social interaction. *Cognitive Processing, 15*(3), 307-16. Doi:10.1007/s10339-014-0600-x.

Sperry, L., Neitzel, J., & Engelhardt-Wells, K. (2010). Peer-mediated instruction and intervention strategies for students with autism spectrum disorders. *Preventing School Failure, 54*(4), 256-264. Doi:10.1080/10459881003800529.

Spengler, S., Bird, G. & Brass, M. (2010). Hyperimitation of actions is related to reduced understanding of others' minds in autism spectrum conditions. *Biological Psychiatry, 68*(12), 1148-55. Doi:10.1016/j.biopsych.2010.09.017.

Stevens, A. & Bernier, R. (2013). Rote memory. In: F.R. Volkmar (Ed.). *Encyclopedia of Autism Spectrum Disorders*. New York, NY: Springer. Doi: https://doi.org/10.1007/978-1-4419-1698-3_750.

Stone, W., Ulman, T., Swanson, A., McMahon, C., & Turner, L. (2004, May). *Structured vs. naturalistic object imitation in young children with ASD.* Poster presented at the annual meeting of the International Meeting for Autism Research, Sacramento, CA.

Strain, P. S., & Bovey, E. H. II. (2011). Randomized, controlled trial of the LEAP model of early intervention for young children with autism spectrum disorders. *Topics in Early Childhood Special Education, 31*(3), 133-154. Retrieved from http://dx.doi.org/10.1177/0271121411408740

Strain, P. S., & Hoyson, M. (2000). The need for longitudinal, intensive social skill intervention: LEAP follow-up outcomes for children with autism. *Topics in Early Childhood Special Education, 20*(2), 116-122. Retrieved from http://dx.doi.org/10.1177/027112140002000207.

Suby, J. (2009). *The use of videotape feedback in physical education*. Unpublished manuscript. Center for Teaching Excellence, United States Military Academy, West Point, NY. Retrieved from https://uvur.pw › the_use_of_videotape_feedback.pdf

Suchy, Y. & Holdnack, J (2013). Chapter 8 - Assessing social cognition using the ACS for WAIS-IV and WMS-IV. In: J. A. Holdnack, L. W. Drozdick, L. G. Weis & G. L. Iverson (Eds.). *WAIS-IV, WMS-IV and ACS: Advanced Clinical Interpretation* (pp. 367-406). London, UK: Elsevier. Retrieved from https://doi.org/10.1016/B978-0-12-386934-0.00008-0

Sukhodolsky, D. G., Scahill, L., Gadow, K. D., Arnold, E.,Aman, M G., McDougle, C. J. …Vitiello, B. (2007). Parent-rated anxiety symptoms in children with pervasive developmental disorders: frequency and association with core autism symptoms and cognitive functioning. *Journal of Abnormal Child Psychology, 36*(1), 117-128. Retrieved from https://doi.org/10.1007/s10802-007-9165-9

Sulzer-Azaroff, B., Hoffman, A. O., Horton, C. B., Bondy, A., & Frost, L. (2009). The Picture Exchange Communication System (PECS): What do the data say? *Focus on Autism and Other Developmental Disabilities, 24*(2), 89-103. Retrieved from http://dx.doi.org/10.1177/1088357609332743.

Surian, L., Caldi, S. & Sperber, D. (2007). Attribution of beliefs by 13-month-old infants.

Psychological Sciences, 18(7), 580-6. Doi:10.1111/j.1467-9280.2007.01943.x

Sussman, F. (1999). *More than words: Helping parent promote communication and social skills in children with autism spectrum disorder*. Toronto, Canada: The Hanen Centre.

Taylor, J. L. & Gotham, K. O. (2016). Cumulative life events, traumatic experiences, and psychiatric symptomatology in transition-aged youth with autism spectrum disorder. *Journal of Neurodevelopmental Disorders, 8*, 28. Doi:10.1186/s11689-016-9160-y.

Teufel, C., Fletcher, P. C. & Davis, G. (2010). Seeing other minds: attributed mental states influence perception. *Trends in Cognitive Sciences, 14*(8), 376-382. Retrieved from https://doi.org/10.1016/j.tics.2010.05.005.

Texas Education Agency (2015). *Social communication questionnaire.* Retrieved from http://www.txautism.net/assets/uploads/docs/SCQ-ed-KS-AK.pdf

Thiemann, K. S. & Goldstein, H. (2001). Social stories, written text cues, and video feedback: effects on social communication of children with autism. *Journal of Applied Behavior Analysis, 34*(4), 425–446. Doi:10.1901/jaba.2001.34-425.

Thompson, R. A. & Newton, E. K. (2013). Baby altruists? Examining the complexity of prosocial motivation in young children. *Infancy, 18*, 120-133. Doi:10.1111/j.1532-7078.2012.00139.x.

Tine, M. & Lucariello, J. (2012). Unique theory of mind differentiation in children with autism and Asperger syndrome. *Autism Research and Treatment, 2012*, 505393. Doi:10.1155/2012/505393

Tissot, C., & Evans, R. (2003). Visual teaching strategies for children with autism. *Early Child Development and Care, 173*(4), 425-433. Retrieved from http://dx.doi.org/10.1080/0300443032000079104.

Tomasello, M. & Call, J. (2008). Does the chimpanzee have a theory of mind? 30 years later. *Trends in Cognitive Sciences, 12*(5), 187-192. Retrieved from https://doi.org/10.1016/j.tics.2008.02.010.

Tomasello, M., Carpenter, M., Call, J., Behne, T. & Moll, H. (2005). Understanding and sharing intentions: the origins of cultural cognition. *The Behavioral and Brain Sciences, 28*(5), 675-91. Retrieved from https://www.ncbi.nlm.nih.gov/pubmed/16262930.

Tomasello, M. & Vaish, A. (2013). Origins of human cooperation and morality. *Annual Review of Psychology, 64*, 231-55. Doi:10.1146/annurev-psych-113011-143812

Treating Autism, (2013). *Medical comorbidities in autism spectrum disorder: a primer for health care professionals and policy makers*. Retrieved from https://nationalautismassociation.org/pdf/MedicalComorbiditiesinASD2013.pdf

Tsui, G. H., & Rutherford, M. D. (2014). Video self-modeling is an effective intervention for an adult with autism. *Case Reports in Neurological Medicine, 2014*, 425897. Doi:10.1155/2014/425897.

Uchino B. N. (2006). Social support and health: a review of physiological processes potentially underlying links to disease outcomes. *Journal of Behavioral Medicine, 29*(4), 377-87. Doi:10.1007/s10865-006-9056-5

Uddin, L.Q., Davies, M., Scott, A., Zaidel, E., Bookheimer, S., Iacoboni, M. & Dapretto, M. (2008). Neural basis of self and other representation in autism: An fMRI study of self-face recognition. *PLoS ONE, 3*(10), e3526. Retrieved from https://doi.org/10.1371/journal.pone.0003526

Van Steensel, F. J., Bögels, S. M., & Perrin, S. (2011). Anxiety disorders in children and adolescents with autistic spectrum disorders: a meta-analysis. *Clinical Child and Family Psychology Review, 14*(3), 302-17. Doi:10.1007/s10567-011-0097-0.

Vivanti, G., & Hamilton, A.F. (2014). Imitation in autism spectrum disorders. In F. R. Volkmar, R. Paul, S. J. Rogers, & K. A. Pelphrey (Eds.), *Handbook of autism and pervasive developmental disorders* (Vol. 1, pp. 278-301). Hoboken, NJ: Wiley.

Völlm, B. A., Taylor, A. N., Richardson, P., Corcoran, R., Stirling, J., McKie, S. … Elliot, R.

(2006). *Neuroimage, 29*(1), 90-8. Doi:10.1016/j.neuroimage.2005.07.022

Vogeley, K. (2017). Two social brains: neural mechanisms of intersubjectivity. *Philosophical Transactions of the Royal Society, Series B, Biological Sciences, 372*(1727). Retrieved from https://doi.org/10.1098/rstb.2016.0245

Von dem Hagen, E, A. H. & Bright, N. (2017). High autistic trait individuals do not modulate gaze behaviour in response to social presence but look away more when actively engaged in an interaction. *Autism Research, 10*(2), 359–368. Doi:10.1002/aur.1666 .

Vuilleumier, P. & Pourtois, G. (2007). Distributed and interactive brain mechanisms during emotion face perception: evidence from functional neuroimaging. *Neuropsychologia, 2007*(45), 174-194. Doi:10.1016/j.neuropsychologia.2006.06.003.

Vulchanova, M., Saldaña, D., Chahboun, S. & Vulchanov, V. (2015). Figurative language processing in atypical populations: the ASD perspective. *Frontiers in Human Neuroscience*. Retrieved from https://doi.org/10.3389/fnhum.2015.00024

Vygotsky, L.S. (1978). Interaction between learning and development. In Gauvain & Cole (Eds.), *Readings on the development of children* (pp. 34-40). New York: Scientific American Books. Retrieved from https://www.faculty.mun.ca/cmattatall/Vygotsky_1978.pdf

Wainscot, J. J., Naylor, P., Sutcliffe, P., Tantam, D. & Williams, J. V. (2008). Relationships with peers and use of the school environment of mainstream secondary school pupils with Asperger syndrome (high-functioning autism): A case-control study. *International Journal of Psychology and Psychological Therapy, 8*(1), 25-38. Retrieved from http://www.redalyc.org/articulo.oa?id=56080103

Wert, B. J. (2002). *Video self-modeling as a technique for increasing spontaneous requests of objects and actions in children with autism spectrum disorders*. (Unpublished doctoral dissertation). Pennsylvania State University, University Park, PA

Wert, B.Y. & Neisworth, J. (2003). Effects of video self-modeling on spontaneous requesting

in children with autism. *Journal of Positive Behaviour Interventions*. Retrieved from https://journals.sagepub.com/doi/10.1177/10983007030050010501

Westby, C. E. (2014). Social neuroscience and theory of mind. *Folia Phoniatrica et Logopaedica*, *66*(1-2):7–17. Retrieved from https://doi.org/10.1159/000362877

Westby, C. & Robinson, L. (2014). A developmental perspective for promoting theory of mind. *Topics in Language Disorders*, *34*(4), 362-382. Retrieved from https://pdfs.semanticscholar.org/bce3/bd9368d17e97f74e704d9405ace12d9dbbcd.pdf

White, S. W., Oswald, D., Ollendick, T. & Scahill, L. (2009). Anxiety in children and adolescents with autism spectrum disorder. *Clinical Psychology Review*, *29*(3), 216-229. Doi:10.1016/j.cpr.2009.01.003.

Whyte, W.F. & Marshall, L. (1970). Man as a social animal. In Social Sciences Foundation Course Team (Eds.), *Understanding society* (pp. 80-106). London, England: Palgrave Macmillan.

Wicker, B., Keysers, C., Plailly, J., Royet, J. P., Gallese, V. & Rizzolatti, G. (2003). Both of us disgusted in My insula: the common neural basis of seeing and feeling disgust. *Neuron*, *40*(3), 655-664. Retrieved from https://doi.org/10.1016/S0896-6273(03)00679-2

Williams, D. L., Goldstein, G. & Minshew, N. J. (2007). The profile of memory function in children with autism. *Neuropsychology, 20*(1), 21-29. Doi:10.1037/0894-4105.20.1.21

Williams, J. H., Whiten, A., Suddendorf, T. & Perrett, D. I. (2001). Imitation, mirror neurons and autism. *Neuroscience and Biobehavioral Reviews, 25*(4), 287-95. Doi:10.1016/S0149-7634(01)00014-8

Williamson, R. L., Casey, L. B., Robertson, J. S., & Buggey, T. (2013). Video self-modeling in children with autism: A pilot study validating prerequisite skills and extending the utilization of VSM across skill sets. *Assistive Technology, 25*(2), 63-71. Retrieved from https://doi.org/10.1080/10400435.2012.712604.

Williford, A. P., Whittaker, J. E. V., Vitiello, V. E., & Downer, J. T. (2013). Children's engagement within the preschool classroom and their development of self-regulation. *Early Education and Development, 24*(2), 162–187. Doi:10.1080/10409289.2011.628270

Winter-Messiers, M. A. (2007). From tarantulas to toilet brushes: Understanding the special interest areas of children and youth with Asperger syndrome. *Remedial and Special Education, 2007*. Retrieved from https://doi.org/10.1177/07419325070280030301

Wong, C., Odom, S. L., Hume, K., Cox, A. W., Fettig, A., Kucharczyk, S. … Schultz, T. R. (2013). *Evidence-based practices for children, youth, and young adults with autism spectrum disorder.* Chapel Hill: The University of North Carolina, Frank Porter Graham Child Development Institute, Autism Evidence-Based Practice Review Group. Retrieved from http://autismpdc.fpg.unc.edu/sites/autismpdc.fpg.unc.edu/files/2014-EBP-Report.pdf

World Health Organization (1994). *The ICD-10 classification of mental and behavioural disorders: Diagnostic criteria for research.* Geneva: World Health Organization, 1994. Retrieved from https://www.who.int › classifications › icd › bluebook.

World Health Organization (2018). *Autism spectrum disorders*. Retrieved from https://www.who.int/news-room/fact-sheets/detail/autism-spectrum-disorders

Wynkoop, K. S. (2016). *The effects of two video modeling interventions on the independent living skills of students with autism spectrum disorder and intellectual disability* (Unpublished Doctoral Dissertation). University of Pittsburgh, Pittsburgh, Pennsylvania.

Young, E. C., Diehl, J. J., Morris, D., Hyman, S. L. & Bennetto, L. (2005). *Language, Speech and Hearing Services in Schools, 36*(1), 62-72. Retrieved from https://www.ncbi.nlm.nih.gov/pubmed/15801508

Zwaigenbaum, L., Bryson, S., Rogers, T., Roberts, W., Bryan, J., & Szatmari, P. (2005).

Behavioral manifestations pof autism in the first year of life. *International Journal of Developmental Neuroscience, 23,* 143-152. Doi:10.1016/j.ijdevneu.2004.05.001

Appendix A

HUMAN ETHICS COMMITTEE

Secretary, Rebecca Robinson
Telephone: +64 03 369 4588, Extn 94588
Email: human-ethics@canterbury.ac.nz

Ref: HEC 2018/31 Amendment 1

19 October 2018

Ingrid Anne Yu Chi
Communication Disorders
UNIVERSITY OF CANTERBURY

Dear Ingrid

Thank you for your request for an amendment to your research proposal "Using Video Self-Modelling to Improve the Social Communication Skills of Children with Autism" as outlined in your email dated 2nd October 2018.

I am pleased to advise that this request has been considered and approved by the Human Ethics Committee.

Yours sincerely

pp. R. Robinson

Professor Jane Maidment
Chair, Human Ethics Committee

Please note that ethical approval relates only to the ethical elements of the relationship between the researcher, research participants and other stakeholders. The granting of approval by the Educational Research Human Ethics Committee should not be interpreted as comment on the methodology, legality, value or any other matters relating to this research. F E S

Appendix B

Ingrid Anne Yu Chi
Department of Communication Disorders
+64 3 369 4827
ingrid.chi@pg.canterbury.ac.nz

UNIVERSITY OF CANTERBURY
Te Whare Wānanga o Waitaha
CHRISTCHURCH NEW ZEALAND

Letter to Health and Service Agencies

01/10/18

Dear Sir/Madamme:

My name is Ingrid Anne Yu Chi and I am currently undertaking a research project for my studies towards a Master of Science in Speech and Language Sciences at the University of Canterbury. I am studying video self-modelling for improving social communication skills in children with Autism Spectrum Disorder. Video self-modelling is a technique based on observational learning in which individuals view back-edited footages of their behaviour, which encourages them to model this target behaviour. The study aims to provide additional evidential data about the efficacy of video self-modelling intervention in the home setting as the child interacts with another family member. Hence, the study will be conducted in the children's homes on predetermined days and times. An adult family member will always be present with the child at home throughout the study. While this type of intervention has been successful in other research studies, I am unable to guarantee positive results specifically for the children involved in this study. However, the intention is that I will work together with the family members as a team to help the child achieve their best outcome possible.

I am currently recruiting children to participate in my study. The project will involve your support in identifying those who fit the participant description, and passing on the appropriate information provided, to their respective families, parents, guardians or caregivers.

To participate the child will have:

- A desire to learn a new social communication skill (e.g. requesting for object, responding to greeting)
- A diagnosis of autism spectrum disorder (ASD)
- The ability to express in at least one-word utterances.
- The ability to attend (watch in one sitting without moving away or looking away) to a 2-3 minute video
- Be aged between 5-10 years
- Reside in Whangarei, Northland, New Zealand

Participation in this study is voluntary. The children or their parents/caregivers have the right to withdraw from the study at any time, including the withdrawal of information, providing it is practically achievable. I will take particular care to ensure the confidentiality of all data gathered for this study and ensure the participants' anonymity in any publications of the findings. All raw data will be held securely and kept for a minimum period of 5 years following completion of the project and then destroyed. This is standard procedure in accordance with University of Canterbury policy. The resulting assignment will not contain any identifying details about the agency, the children, their parents or families, or any other professionals who work at the agency. The results from this research will be used for my master's thesis which will be presented to my supervisors and external markers.

The results of the project may be published, but you may be assured of the complete confidentiality of data gathered in this investigation: your agency, the parents, families and the children's identities will not be made public without prior consent. To ensure confidentiality, your agency, the parents/families and the children will be given code names throughout the study to protect your identities. Any information that contains your agency, the parents/families or the children's names will be kept in a password protected file, in a password protected computer at the researcher's home that will only be accessible to the researcher throughout the duration of the study. Hard copies of these data without any identifying information, will also be stored in password protected files in password protected computers at the Communication Disorders building at the University of Canterbury, only accessible to my two supervisors, Dr. Jayne Newbury and Dr. Dean Sutherland.

When the study is written up and complete, it will be made a public document on the University of Canterbury website via the UC library database, however no names will be included in the final copy. This study will also be reviewed and approved by the University of Canterbury Human Ethics Committee.

If you would like to know more about my study, please contact me on the details above. If you have a complaint about the study, you may contact either of my supervisors, Dr. Jayne Newbury at jayne.newbury@canterbury.ac.nz and Dr. Dean Sutherland at dean.sutherland@caterbury.ac.nz, or the Chair, Educational Research Human Ethics Committee, University of Canterbury, Private Bag 4800, Christchurch (human-ethics@canterbury.ac.nz). I appreciate your support in this research.

Sincerely,

Ingrid Anne Yu Chi

Appendix C

Ingrid Anne Yu Chi
Department of Communication Disorders
+64 3 369 4827
ingrid.chi@pg.canterbury.ac.nz

UNIVERSITY OF CANTERBURY
Te Whare Wānanga o Waitaha
CHRISTCHURCH NEW ZEALAND

01/10/18

An invitation to participate in a study investigating the effects of video self-modelling on the social communication skills of children with Autism Spectrum Disorder.

I am conducting research in this area as part of my Masters in Speech and Language Sciences thesis. I am currently recruiting children in my study.

To participate the child will have;

- A desire to learn a new social communication skill (e.g. requesting for object, responding to greeting)
- A diagnosis of autism spectrum disorder (ASD)
- The ability to express in at least one-word utterances.
- The ability to attend (watch in one sitting without moving away or looking away) to a 2-3 minute video
- Be aged between 5-10 years
- Reside in Whangarei, Northland, New Zealand

If you would like to know more about my study please refer to the information pack provided and contact myself or one of my supervisors should you have any questions. I appreciate your consideration of participation in this research.

Sincerely,

Ingrid Anne Yu Chi

Appendix D

Ingrid Anne Yu Chi
Department of Communication Disorders
64 3 369 4827
ingrid.chi@pg.canterbury.ac.nz

UNIVERSITY OF CANTERBURY
Te Whare Wānanga o Waitaha
CHRISTCHURCH NEW ZEALAND

01/10/18

Information Sheet for Parents

I am a Masters student at the University of Canterbury. I am studying video-self modelling for improving social communication skills in children with Autism Spectrum Disorder.

I am currently looking for children to participate in my study. If you are interested, the first step is to talk with me on the phone about your child so that I can see if your child would be a good match for the study and vice versa. The study aims to provide additional evidential data about the efficacy of video self-modelling intervention in the home setting, as the child interacts with another family member. Hence, the study will be conducted at your home, on predetermined days and times. An adult family member will always be present with the child at home throughout the study. While this type of intervention has been successful in other research studies, I am unable to guarantee positive results specifically for your child. However, the intention is that we will work together as a team to help your child achieve their best outcome possible.

If we agree that your child and this study are a good match for each other, I would come and visit your home. At this visit we will complete the Social Communication Questionnaire. This is a series of questions about your child's communication and may take up to 45 minutes. This information will be used to double check your child would be eligible for the study and if so, to decide on a specific skill that I would teach your child. I would explain the study to you and your child in more detail, and if you still wanted your child to be in the study, you would sign the consent form and your child would sign the assent form. At this visit, I would also like to obtain a copy of your child's professional diagnostic report. This is required to verify your child's diagnosis with autism from a qualified professional.

As part of the study, your child will then be asked to take part in developing a short video which will show them successfully performing the target skill. The filming will take place at your home at a pre-agreed time. On the third week, the child will be given their video to watch at least once a day for 5 days. I will be with your child when they watch the video. Six weeks after the intervention, follow-up data will be recorded again at your residence for 3 consecutive days. For the duration of this study, I will be visiting your home over 5 weeks, 3-5 days a week on weekdays, ranging from 30 minutes to one hour each day, to observe, carry out intervention procedure, and collect data about the target skill. This includes the 3-day follow-up data recording, six weeks after intervention.

You will be there to check your child is comfortable with the intervention at all times. If you are concerned your child is experiencing distress during the intervention, you need to let the researcher know immediately and the intervention will pause. If a solution can be found, for example, the researcher visiting at another time of the day when your child is less tired, the researcher will accommodate this change where possible. If it is not possible to complete the

intervention without causing the child distress, it is important you withdraw your child from the study.
Participation is voluntary and there will be a complementary $20 shopping voucher for your child if he or she finishes the study. Alternatively, you will have the right to withdraw at any stage without penalty. If you withdrew from the study, you may ask for your and your child's information or raw data to be returned to you or destroyed at any point, and I will remove your and your child's information from the study. However, once analysis of raw data starts, it will become increasingly difficult to remove the influence of your data on the results.

As a follow-up to this investigation, on the last day of follow-up data recording six weeks after intervention, you will be asked to complete a questionnaire regarding what you thought about the intervention and its effectiveness.

The results of the project may be published, but you may be assured of the complete confidentiality of data gathered in this investigation: your identity and your child's identity will not be made public. To ensure confidentiality, both you and your child will be given a code name throughout the study to protect your identities. Any information that contains you or your child's name will be kept in a password protected file, in a password protected computer at the researcher's home that will only be accessible to the researcher throughout the duration of the study. Hard copies of these data without any identifying information, will also be stored in password protected files in password protected computers at the Communication Disorders building at the University of Canterbury, only accessible to my two supervisors, Dr. Jayne Newbury and Dr. Dean Sutherland.

Any research or document containing your or your child's names will be destroyed after the study, and any published or reported results of the study will protect the identity and anonymity of both you and your child. You will be provided with a copy of the summary of results of the study at the completion of the research. When the study is written up and complete, it will be made a public document on the University of Canterbury website via the UC library database, however no names will be included in the final copy. This study will also be reviewed and approved by the University of Canterbury Human Ethics Committee.

The study is being carried out as a requirement for a Master of Science (MSc) in Speech and Language Sciences by Ingrid Anne Yu Chi under the supervision of Dr. Jayne Newbury who can be contacted at jayne.newbury@canterbury.ac.nz and Dr. Dean Sutherland who can be contacted at dean.sutherland@canterbury.ac.nz. They will be pleased to discuss any concerns you may have about participation in the project.

This project has been reviewed and approved by the University of Canterbury Human Ethics Committee, and participants should address any complaints to The Chair, Human Ethics Committee, University of Canterbury, Private Bag 4800, Christchurch (human-ethics@canterbury.ac.nz).

Sincerely,

Ingrid Anne Yu Chi

Appendix E

Would you like to be a part of a study that will teach you a new skill using video self-modelling ?

Who will see your information?

The only people who will be able to see your information and the movie will be your parents and the people doing the research.

What will you have to do?

If you take part in the study, you will help the researcher make a movie and you'll be the star! You will see yourself doing something you haven't done before.

Do I have to be in the study?

You don't have to be in the study if you don't want to. If you choose not to be in the study just let your parents or I know. Most importantly, if you say yes to begin with and then change your mind later on, you can still pull out of the study.

What are the benefits of being in this study?

This study will help us understand more about using video self-modelling to teach new skills,

And most importantly, you will receive a $20 shopping voucher if you watch your video everyday for one week!

You will also receive a summary of the results at the end of the study.

Questions

If you have any questions, you can talk to your parents. I will be visiting your home where I can take all your questions. If you think of a question during the study, your parents can contact me, too.

Appendix F

Ingrid Anne Yu Chi
Department of Communication Disorders
64 3 369 4827
ingrid.chi@pg.canterbury.ac.nz

01/10/18

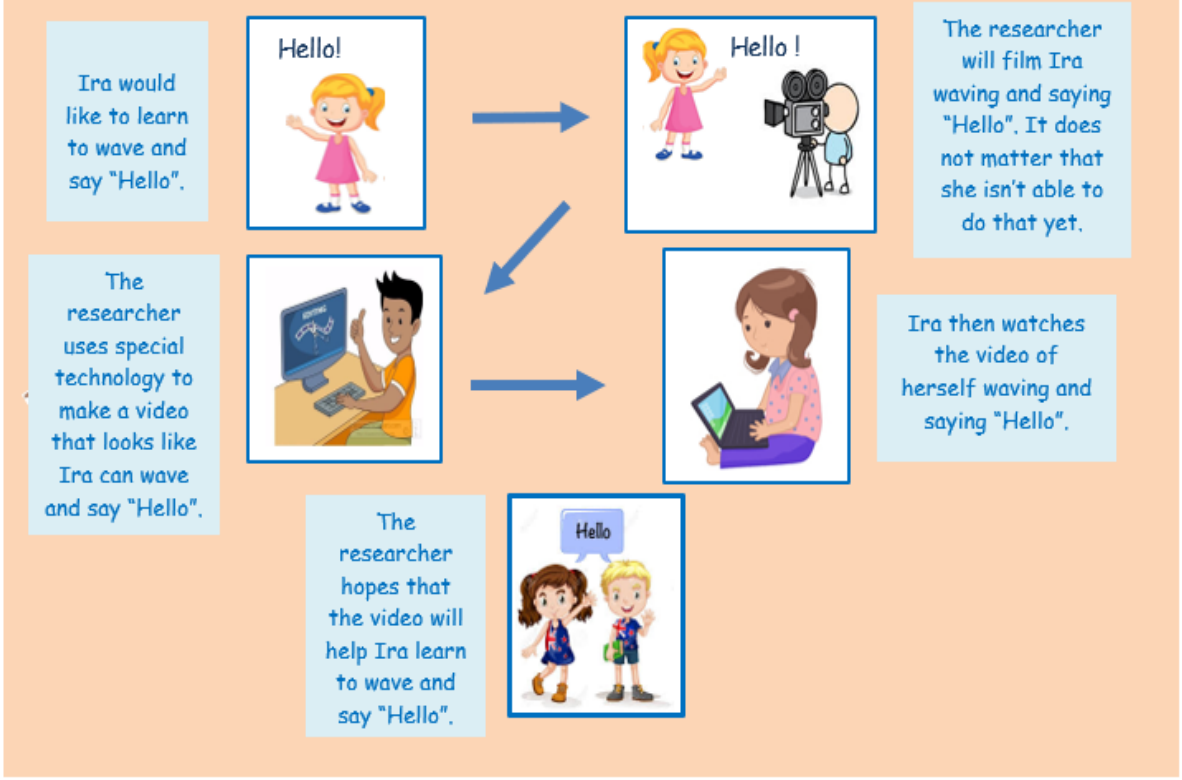
Information Sheet for Children

Hi, my name is Ingrid Anne Yu Chi. I am a student at the University of Canterbury. I'm currently studying how video self-modelling can teach new skills to children.

What is a study?

A study is when researchers, like myself, need to collect information to learn about a topic of interest. I want to learn about video self-modeling, and your skills at home.

Video self-modelling is when we watch videos of ourselves doing things that we can't quite do on our own just yet. Here's an example of how it works.



Appendix G

Screening Interview for Parent

Your Name:

Your relationship to the child:

Child's name:

Child's Date of Birth:

Is your child able to attend to a 2-4 minute video? (circle) Yes / No

Does your child produce at least one-word utterances? (circle) Yes / No

What is your child's diagnosis?

When was your child diagnosed with ASD?

Who diagnosed your child?

If known, what assessments/tools were used for diagnosis?

Does your child have any secondary diagnoses?

Is your child currently on any medication?

Please provide information below regarding any specific difficulties your child faces at home with social communication skills (e.g. initiating and responding to greeting, requesting for object, taking turns, protesting/rejecting, asking for help).

Are there currently any other services involved in providing intervention for your child in (specific situation)?

Appendix H

Ingrid Anne Yu Chi
Department of Communication Disorders
64 3 369 4827
ingrid.chi@pg.canterbury.ac.nz

UNIVERSITY OF CANTERBURY
Te Whare Wānanga o Waitaha
CHRISTCHURCH NEW ZEALAND

01/10/18

Consent Form for Parents

I have been given a full explanation of this project and have had the opportunity to ask questions. I understand what is required of me if I agree to take part in the research.

I understand that participation is voluntary, and I may withdraw at any time without penalty. If I withdraw from participation this will include any information I have provided to be withdrawn should this remain achievable.

I understand that any information or opinions I provide will be kept confidential to the researcher, Dr Jayne Newbury, and Dr Dean Sutherland, and that any published or reported results will not identify me or my child. I understand that a thesis is a public document and will be available through the UC Library.

I understand that all data collected for the study will be kept in locked and secure facilities and/or in password protected electronic form. Data may be stored up to ten years.
I understand that I will be provided a copy of the summary of results of the study at the conclusion of the project.

I understand that I can contact the researcher Ingrid Anne Chi at ingrid.chi@pg.canterbury.ac.nz or on 022 158 3778, and supervisors Dr Jayne Newbury at jayne.newbury@canterbury.ac.nz on +64 3 3695798, and Dr. Dean Sutherland at dean.sutherland@canterbury.ac.nz on +64 3 369 5090 for further information. If I have any complaints, I can contact the Chair of the University of Canterbury Human Ethics Committee, Private Bag 4800, Christchurch (human-ethics@canterbury.ac.nz).

By signing below, I agree to participate in the research project.

I…… (full name) hereby consent for my child

…….. (full name) to take part in this study

Signature……Date……

Contact Details:

Phone No: _____ Email: _____

Appendix I

Ingrid Anne Yu Chi
Department of Communication Disorders
64 3 3694827
ingrid.chi@pg.canterbury.ac.nz

UNIVERSITY OF CANTERBURY
Te Whare Wānanga o Waitaha
CHRISTCHURCH NEW ZEALAND

01/10/18

Assent Form for Children

Sign the form only if you:

- ✓ Have understood what you will be doing in this study,
- ✓ Have had all your questions answered,
- ✓ Have talked to your parent(s) or legal guardian(s) about this project, and
- ✓ Agree to take part in this research.

Print your name here: _____

Signature: _____

Date: _____ / _____ / _____

Day Month Year

Appendix J

Social Communication Questionnaire (SCQ) – Current
PC Answer Sheet

Michael Rutter, M.D., F.R.S., Anthony Bailey, M.D., Sibel Kazak Berument, Ph.D.,
Catherine Lord, Ph.D., and Andrew Pickles, Ph.D.

Name of Subject: _____ D.O.B. _____ Interview Date _____ Age: ____

Gender: ○ F ○ M Name of Respondent: _____ Relation to Subject: _____

Directions: Thank you for taking the time to complete this questionnaire. Please answer each question by selecting *yes* or *no*. A few questions ask about several related types of behavior; please select *yes* if *any* of these behaviors were present during the past 3 months. Although you may be uncertain about whether some behaviors were present or not, please answer *yes* or *no* to every question on the basis of what you think.

Item	Yes	No
1. Is she/he now able to talk using short phrases or sentences? If *no*, skip to question 8.	○	○
2. Do you have a to and fro "conversation" with her/him that involves taking turns or building on what you have said?	○	○
3. Does she/he ever use odd phrases or say the same thing over and over in almost exactly the same way (either phases that she/he hears other people use or ones that she/he makes up?	○	○
4. Does she/he ever use socially inappropriate questions or statements? For example, does she/he ever regularly ask personal questions or make personal comments at awkward times?	○	○
5. Does she/he ever get his/her pronouns mixed up (e.g., saying *you* or *she/he* for *I*)?	○	○
6. Does she/he ever use words that she/he seems to have invented or made up her/himself; put things in odd, indirect ways; or use metaphorical ways of saying things (e.g., saying *hot rain* for *steam*)?	○	○
7. Does she/he ever say the same thing over and over in exactly the same way or insist that you say the same thing over and over again?	○	○
8. Does she/he have things that she/he seems to do in a very particular way or order or rituals that she/he insists that you go through?	○	○
9. Does her/his facial expressions usually seem appropriate to the particular situation, as far as you can tell?	○	○
10. Does she/he ever use your hand like a tool or as if it were part of his/her own body (e.g., pointing with your finger or putting your hand on a doorknob to get you to open the door)?	○	○
11. Does she/he ever have any interests that preoccupy her/him and might seem odd to other people (e.g., traffic lights, drainpipes, or timetables)?	○	○
12. Does she/he ever seem to be more interested in parts of a toy or an object (e.g., spinning the wheels of a car), rather than in using the object as it was intended?	○	○
13. Does she/he ever have any special interests that are *unusual* in their intensity but otherwise appropriate for his/her age and peer group (e.g., trains or dinosaurs)?	○	○
14. Does she/he ever seem to be *unusually* interested in the sight, feel, sound, taste, or smell of things or people?	○	○
15. Does she/he ever have any mannerisms or off ways of moving her/his hands or fingers, such as flapping or moving her/his fingers in front of her/his eyes?	○	○
16. Does she/he ever have any complicated movements of her/his whole body, such as spinning or repeatedly bouncing up and down?	○	○

Item	Yes	No
17. Does she/he ever injure her/himself deliberately, such as by biting her/his arm or banging her/his head?	○	○
18. Does she/he ever have any objects (*other* than a soft toy or comfort blanket) that she/he *has* to carry around?	○	○
19. Does she/he have any particular friends or a best friend?	○	○
20. Does she/he ever talk with you just to be friendly (rather than to get something)?	○	○
21. Does she/he ever *spontaneously* copy you (or other people) or what you are doing (such as vacuuming, gardening, or mending things)?	○	○
22. Does she/he ever spontaneously point at things around her/him just to show you things (not because she/he wants them?	○	○
23. Does she/he ever use gestures, other than pointing or pulling your hand, to let you know what she/he wants?	○	○
24. Does she/he nod her/his head to indicate *yes*?	○	○
25. Does she/he shake her/his head to indicate *no*?	○	○
26. Does she/he usually look at you directly in the face when doing things with you or talking with you?	○	○
27. Does she/he smile back if someone smiles at her/him?	○	○
28. Does she/he ever show you things that interest her/him to engage your attention?	○	○
29. Does she/he ever offer to share things other than food with you?	○	○
30. Does she/he ever seem to want you to join in her/his enjoyment of something?	○	○
31. Does she/he ever try to comfort you if you are sad or hurt?	○	○
32. If she/he wants something or wants help, does she/he look at you and use gestures with sounds or words to get your attention?	○	○
33. Does she/he show a normal range of facial expressions?	○	○
34. Does she/he ever spontaneously join in and try to copy the actions in social games, such as *The Mulberry Bush* or *London Bridges Is Falling Down*?	○	○
35. Does she/he play any pretend or make-believe games?	○	○
36. Does she/he seem interested in other children of approximately the same age whom she/he does not know?	○	○
37. Does she/he respond positively when another child approaches her/him?	○	○
38. If you come into a room and start talking to her/him without calling her/his name, does she/he usually look up and pay attention to you?	○	○
39. Does she/he ever play imaginative games with another child in such a way that you can tell that each child understands what the other is pretending?	○	○
40. Does she/he play cooperatively in games that need some form of joining in with a group of other children, such as hide-and-seek or ball games?	○	○

Appendix K

Social Communication Observation Form

Participant: **Kyle**

Session date: _____ Session no: _____ Observer: Inah

Experimental condition (please encircle):

Baseline Intervention (Maintenance 1) Generalisation Maintenance 2

Observation start time: _____ Observation stop time: _____

Cue Question: **"Do you want _____?"**

Target Response: **"YES"**

Occurrence	Yes	No	Undesired Responses (G=Grabbing; H=Hitting; S=Screaming; C=Crying)
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
Total			

Notes:

_____

_____

_____

_____

_____

_____

Appendix L

Follow-up Questionnaire for Parents

Please answer these questions honestly. Your responses will remain confidential and will only be seen by my supervisors and myself. Read each question carefully and encircle the most relevant answer to each question.

Social Validity

1.	Learning how to (target skill) is an important skill for children with ASD. Strongly Disagree Disagree Neutral Agree Strongly Agree
2.	My child gained adequate skills to improve in (target skill) by participating in the study. Strongly Disagree Disagree Neutral Agree Strongly Agree
3.	My child is now more confident in (target skill) from participating in the study. Strongly Disagree Disagree Neutral Agree Strongly Agree
4.	The implementation of treatment DID NOT cause any disruption to my child's daily routine. Strongly Disagree Disagree Neutral Agree Strongly Agree
5.	I believe video self-modelling was solely responsible for my child learning his/her new social communication skill. Strongly Disagree Disagree Neutral Agree Strongly Agree
6.	I would recommend the video-self modelling method as an effective way to teach children with ASD. Strongly Disagree Disagree Neutral Agree Strongly Agree
7.	I would consider creating videos like these myself in the future. Strongly Disagree Disagree Neutral Agree Strongly Agree

Generalization (i.e. Does child use new social communication skills appropriately in other ways?)

Have the skills learnt from the video-self modelling generalized to any other situations? YES NO

If **yes**, list situations:(e.g. when playing, watching TV, etc) _____

Have the skills learnt from the video-self modelling generalized to any other settings? YES NO

If **yes,** list settings:(e.g. when in playground, school, etc.) _____

Have the skills learnt from the video-self modelling generalized to any other persons? YES NO

If **yes**, list persons:(e.g. with dad, nan, teacher, etc) _____