



Cross-Cultural Adaptation to Australia of the KONTAKT© Social Skills Group Training Program for Youth with Autism Spectrum Disorder: A Feasibility Study

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Abstract

This study investigated the feasibility and cultural validity of KONTAKT©, a manualised social skills group training, in improving the social functioning of adolescents with autism spectrum disorder (ASD). KONTAKT© was delivered to 17 adolescents ($m_{\text{age}} = 14.09$, $SD_{\text{age}} = 1.43$; 70% male) with ASD over sixteen 90 min sessions. A pre-test post-test design evaluated changes in personally meaningful social goals, symptom severity, quality of life, interpersonal efficacy, social anxiety, loneliness, and facial emotion recognition at pre, post and 3 months follow-up. Focus groups were conducted post intervention. Findings indicate that KONTAKT© may support Australian adolescents with ASD in achieving their personally meaningful social goals. This study resulted in finalisation of KONTAKT© in preparation for evaluation of its efficacy in a randomised controlled trial (Australian New Zealand Clinical Registry (ANZCTR): ACTRN12617001117303, ClinicalTrials.gov: NCT03294668).

Keywords Social skills group training · Social skills intervention · KONTAKT© · Cross-cultural adaptation · Feasibility · Adolescents · Autism spectrum disorder

Introduction

Autism spectrum disorder (ASD) is a neurodevelopmental condition presenting early in life, characterised by persisting difficulties in social communication and interaction skills, and restricted, repetitive behaviours and interests (American

Psychological Association [APA] 2013). According to the Australian Bureau of Statistics, 164,000 individuals or 0.69% of the total population of Australia were diagnosed with ASD in 2015, with 83% of those diagnosed and requiring support from the National Disability Assistance scheme (NDIS) being below the age of 25 years (Australian Institute of Health and Welfare [AIHW] 2017).

For individuals with ASD and their typically developing (TD) peers, adolescence is a time of significant social

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change, corresponding with a rising interest in peer relationships (Steinberg 2001). Like their TD peers adolescents with ASD prefer social contact to isolation (Attwood 2000), seeking opportunities to interact with their peers (White and Roberson-Nay 2009). However, the challenges associated with ASD and the increasing social complexity and demands of adolescence make this a particularly challenging time for these youth. The outcomes of these difficulties are evident across many life domains with youth with ASD experiencing poorer levels of independent living, fewer friendships, and decreased participation in continuing education and employment as they transition into adulthood, compared to their peers (AIHW 2012; Henninger and Taylor 2013).

An increase in diagnostic rates internationally over recent decades has resulted in an unprecedented growth in the number individuals with ASD and an urgent need for evidence-based interventions aiming to improve outcomes (Taylor et al. 2012). Social skills group training (SSGT) interventions (Table 1) are emerging as a common approach to improve the social skills functioning of adolescents with ASD (Cappadocia and Weiss 2011), demonstrating positive effects on social skills knowledge (Matthews et al. 2018; Yoo et al. 2014), increasing social readiness (Vernon et al. 2018), adaptive functioning (Choque Olsson et al. 2017; Jonsson et al. 2019), and in reducing the severity of autistic symptomatology (Choque Olsson et al. 2017; Gabriels et al. 2015; Jonsson et al. 2019).

Although SSGT interventions demonstrate efficacy across cultures (Choque Olsson et al. 2017; Rabin et al. 2018; Corbett et al. 2016), the target culture of any SSGT intervention must be considered (Marsiglia and Booth 2015) given the significant variation across countries in social milieu,

prevailing culture, socio-political environment, and attitudes towards health and disability (World Health Organization [WHO] 2001). Environmental factors significantly impact an individual's experience of functioning and disability (WHO 2001), featuring prominently in those aspects of functioning most relevant to ASD (Bölte et al. 2014). Given that challenges in social communication are inherent to a diagnosis of ASD (Ravindran and Myers 2012) and the influence of culture on interpersonal interactions, relationships within healthcare (Villagran et al. 2012) and educational settings (Signorini et al. 2009), culture should be considered both in describing functioning and in developing interventions targeting the needs of those with ASD (WHO 2001). It is flawed to assume that a SSGT intervention demonstrating efficacy in adolescents with ASD in one cultural context is directly transferable to other cultures or countries without considering its feasibility and appropriateness to the target population (Radley et al. 2015). Infusing a SSGT intervention with the relevant aspects of a target culture (Barrera et al. 2013) and preliminary evaluation of its cultural appropriateness, encourages intervention fidelity and participant compliance (Marsiglia and Booth 2015).

While previous research evaluating evidence-based SSGT interventions for adolescents with ASD raises the need for cultural adaptation (Bernal et al. 2009; Choque Olsson et al. 2016a, b) a paucity of research has systematically examined either the feasibility of these interventions cross-culturally or the process of cultural adaptation (Rabin et al. 2018; Yoo et al. 2014). To date, a large proportion of the evidence for the efficacy of SSGT interventions in adolescents with ASD has been developed with samples drawn predominately from middle class Caucasian North American backgrounds with the implicit assumption that these interventions are readily transferable and appropriate to other western cultures (Kumpfer et al. 2002). This is despite wide recognition of the significant diversity, even across western cultures, of customs and traditions (Marsiglia and Booth 2015). Aligning a SSGT intervention more closely with a target culture increases the likelihood of replicating and even enhancing the efficacy of an intervention cross-culturally (Marsiglia and Booth 2015).

Australia is one of the most culturally and linguistically diverse countries in the world, with approximately half the current population being born or having a parent born overseas (Australian Bureau of Statistics [ABS] 2012). This phenomenon alone makes Australia a particularly challenging context in which to develop a manualised SSGT intervention targeting the social skills of adolescents with ASD. The predominant culture of Australia has been significantly shaped over the last 200 years by factors such as the deportation of large numbers of convicts from Britain to Australia, and significant immigration from Britain and Europe (Betts 2003; Horsfield and Zusters 2010; Offord et al. 2014; McGregor

Table 1 An overview of social skills group interventions for adolescents evaluated in an RCT

First author	Year	Country	Intervention
Corbett, B	2016	USA	SENSE Theatre
Gabriels, R	2015	USA	Therapeutic Horseback riding
Jonsson, U	2018	Sweden	KONTAKT© (24-session version)
Laugeson, E	2009	USA	PEERS
Lerner, M	2012	USA	SDARI
Matthews, N	2018	USA	Peer mediated PEER
Olsson, N	2017	Sweden	KONTAKT© (12-session version)
Schohl, K	2014	USA	PEERS
Rabin, J	2018	Israel	PEERS
Vernon, T	2017	USA	START
White, S	2013	USA	MASSI
Yoo, H	2014	Korea	PEERS

MASSI Multimodal Anxiety and Social Skills Intervention, PEERS Program for the Education and Enrichment of Relational Skills, SDARI Sociodramatic Affective Relational Intervention, START Social Tool And Rules for Teens

1980). Australians can be characterised by their interest in sports (Lau 2006), their defence of egalitarianism (Horsfield and Zusters 2010), and their ironic and self-deprecating sense of humour (Jones 1988). The explicit and implicit social norms of Australia underpin the requisite social skills required to succeed socially in Australian society and should be considered in developing a SSGT intervention targeting Australian adolescents with ASD.

Given the cultural similarities between Europe and Australia (Kreuter et al. 2005), it was deemed likely that a SSGT originating in Europe (KONTAKT©; Herbrecht and Poustka 2007; Herbrecht et al. 2008, 2011) would be similarly effective in improving the social skills of Australian adolescents with ASD (Afsharnejad et al. 2019). KONTAKT© is a manualized SSGT program which has been fully standardized, culturally adapted, scientifically improved in design for individuals diagnosed with ASD aged 8 to 17 years in Sweden (Bölte 2018; Choque Olsson et al. 2016a, b; 2017; Jonsson et al. 2019).

Previous research conducted in Sweden examined the effectiveness of both the short (12-session) and long (24-session) variants of KONTAKT© in RCTs comparing it with treatment as usual control groups (receiving ongoing treatments only) (Choque Olsson et al. 2017; Jonsson et al. 2019). The efficacy of the short variant of KONTAKT© was evaluated in a study recruiting over 300 children and adolescents with ASD, with adolescents demonstrating small to medium improvements in social communication and interaction challenges as measured by the Social Responsiveness Scale 2nd Edition (SRS-2; Constantino and Gruber 2005) at post-test (effect size [ES] = 0.32, $p = 0.012$; Choque Olsson et al. 2017). Specifically, female adolescents receiving the short 12-session variant of KONTAKT© demonstrated notable improvements in their social communication and interaction scores compared to usual care controls at post-test, approaching a medium effect size (ES = 0.4, $p = 0.019$). Further qualitative investigation revealed that both low responders (showing no more than 10% change) and high responders (showing at least 30% improvement) on the SRS-2 raw score in response to the 12-session variant of KONTAKT© described similarly positive outcomes which they attributed to their participation in KONTAKT©. Participants appreciated the program for its transparency and predictability, commonly expressing their wish for the program to continue (Choque Olsson et al. 2016a, b). More recently, the potential moderating effect of genetic factors on the outcomes of participating in the 12-session variant of KONTAKT© were investigated by Tammimies et al. (2019) in a sample of 207 participants with available genetic information (2019) with analysis revealing that carriers of large genic copy number variations (CNVs; > 500 kb) improved less than non-carriers. This points

to the importance of precision medicine, of customizing interventions in meeting the needs and improving outcomes in sub-groups across the autism spectrum (Tammimies et al. 2019).

Further evaluation of the 24-session variant of KONTAKT© in an RCT ($n = 50$) points to a dosage effect for the program, with participants receiving the 24-session variant demonstrating large improvements in social communication and social interaction at both post-test and follow-up, twice the effect observed in those receiving the 12-session variant (ES = 0.76, $p < 0.001$). This difference was attributed to the greater opportunities and increased time available in the longer program for practicing and consolidating social skills learnt during the participant led sessions (Jonsson et al. 2019).

While the effectiveness of KONTAKT© has been extensively examined for Swedish children and adolescents (Choque Olsson et al. 2016a, b) the cultural transferability of KONTAKT© to other western cultures remains unknown. To date no study has evaluated the efficacy of a SSGT intervention via RCT with Australian adolescents with ASD. This study aimed to systematically assess the feasibility and cross-cultural validity of KONTAKT© for adolescents with ASD in an Australian context: (1) in regards to its preliminary quantitative effects on achieving adolescents personally meaningful social goals (primary outcome), symptom severity, quality of life, interpersonal efficacy, social anxiety, loneliness, and facial emotion recognition (secondary outcomes); (2) by qualitatively exploring the adolescents, their parents/carers and the KONTAKT© trainers lived experiences of participating in and delivering the program; and, (3) tailoring and finalising the KONTAKT© intervention in preparation for further evaluation of its efficacy in an RCT.

Methods

Design

To understand the feasibility and cultural acceptability of KONTAKT© within an Australian service delivery context a three-step study was undertaken: Step 1 involved translation of KONTAKT© from Swedish to English and preliminary cultural adaptation of the program; Step 2 undertook a feasibility study employing a one group pre-test post-test design, informed by the areas of focus as articulated by Bowen et al. (2009) and previously employed in developing interventions in the field of developmental disabilities (Blythe LaGasse 2013; Shields et al. 2019); Step three aimed to refine and finalise KONTAKT© for an Australian context, in preparation for further evaluation via an RCT.

Step 1: Cultural Adaptation and Language Translation

Initially the KONTAKT© manuals and activity books (adolescent, carer and trainer) (Bölte and Choque-Olsson 2011) were translated from Swedish to Australian English with the authors' and publisher's permission. Translations were assessed for accuracy by two of the authors fluent in both Swedish and English (SB & MF). The first draft of the English manuals was then reviewed, edited and proofed by a native English speaker experienced in manualising health interventions (SG).

In accordance with the cultural adaptation model described by Barerra et al. (2013), the next stage sought information informing the preliminary adaptation of KONTAKT©. A working group of five clinicians (child psychologists, occupational trainers, and special education teachers) experienced in delivering group-based interventions to Australian adolescents with ASD was established. This group provided feedback on the cultural appropriateness of the KONTAKT© program, leading to modification of several games and activities, and tailoring of scenario scripts to reflect activities frequently engaged in by Australian adolescents.

Step 2: Feasibility Study

With the aim of assessing the feasibility of KONTAKT© in the Australian context and understanding if further evaluation of the program was warranted this study examined the feasibility of KONTAKT© in relation to its acceptability, potential demand for the program, implementation,

practicality, adaptation, integration, potential for expansion, and preliminary efficacy (Table 2; Bowen et al. 2009). This study employed a one group pre-test post-test design (Gay et al. 2006), to examine the preliminary efficacy of the 16-session variant of KONTAKT© in supporting Australian adolescents achieve primarily, their personally meaningful social goals, and secondarily, reducing the severity of their autistic symptoms and increasing their quality of life. Immediately following the intervention period (at post-test), focus groups were also conducted with adolescents, their parents, and KONTAKT© trainers' in order to understand their experiences with the program and their suggestions for improvement in preparation for the RCT.

KONTAKT© in Australia (16-Session Variant)

KONTAKT© is a SSGT adhering to the general principles of group therapy, with sessions structured according to a defined agenda and underpinned by shared 'group rules', providing a secure space for participants to share their experiences. Each session follows a consistent structure, commencing with an opening round, followed by a discussion and activity round (group games and exercise), snack time, reviewing and assigning homework, and a closing round (Table 3). The activities within KONTAKT© are scaffolded, initially targeting basic social skills, progressing to more complex social skills. KONTAKT© sessions cover various social skills including understanding social rules and relationships, recognizing emotions and developing conversational skills (Bölte 2018).

Table 2 Feasibility methodology and results based on the focus areas outlined by Bowen et al. (2009)

Area of focus	Methodology
Acceptability	<ul style="list-style-type: none"> • Treatment satisfaction scale measuring the level of satisfaction on a four-point Likert scale (1 = yes very much, 2 = yes quite extensively, 3 = yes to some extent and 4 = no) • Participants' qualitative feedback (focus groups)
Demand	<ul style="list-style-type: none"> • Participants' qualitative feedback (focus groups) • Expression of interest received by the service provider • Recruitment rate • Need assessment
Implementation	<ul style="list-style-type: none"> • Training the trainers and monthly supervision of the trainers • Treatment fidelity checklist
Practicality	<ul style="list-style-type: none"> • KONTAKT© attendance rate • Participants' qualitative feedback (focus groups)
Adaptation	<ul style="list-style-type: none"> • Previous evaluations of KONTAKT© in Sweden • Social responsive scale-2
Integration	<ul style="list-style-type: none"> • Certifying the trainers through supervision
Expansion	<ul style="list-style-type: none"> • Economic evaluation of the KONTAKT© program compared to current disability funding schemes for accessing intervention support (NDIS) • Trainers' qualitative feedback (focus groups)
Efficacy testing	<ul style="list-style-type: none"> • Primary/secondary outcomes to assess preliminary efficacy

Table 3 An overview of a KONTAKT© session

Round	Description	Change from Swedish
Opening the session	Initiating contact while promoting interaction between group members by providing a recap of how their week was and how they are feeling. Such as “During the week ...”, “Now I am feeling ...”, and “Now I pass the word to ...”	Same framework as the Swedish version, the name of the activity was changed to “Opening round” in the Australian version
Reviewing homework	Discussing the previous week’s homework assignment with each participant and if necessary troubleshooting some with the group	Same framework as the Swedish version; In the Australian version (1) participants can use different mediums to record their answers (video, voice, computer), (2) the name of the activity was changed to “Mission”
Group exercise	Creating and reinforcing group cohesion and cooperation, encouraging participation and practicing interaction and communication skills (verbal and non-verbal), such as role-play, charade, and group activities (e.g. baking together)	Same framework as the Swedish version; The group discussion and group exercise were swapped in the order they are presented to the participants in the Australian version
Snack break	Interacting in an unstructured situation, practicing turn taking and small talk, if necessary trainers can provide prompts	Same framework as the Swedish version; the name of the activity was changed to “Snack time” in the Australian version
Group discussion	Discussing Social skills topics, based on time and abilities of the participants an advanced option is also provided. Such as “What is ASD?” and the advanced topic of “Telling others about my ASD diagnosis”	Same framework as the Swedish version; The group discussion and group exercise were swapped in the order they are presented to the participants in the Australian version
Homework assignment	Assigning a new homework for the week to practice generalising the skills learned to everyday situations. Such as “Setting goals”, “Analysing difficult situations” or “Setting a play date with a friend”	Same framework as the Swedish version; In the Australian version (1) participants can use different mediums to record their answers (video, voice, computer), (2) the name of the activity was changed to “Mission”
Closing the session	Recapping the Session, saying how it went and providing suggestions on how it can be improved. Such as “I liked ...” and “I am feeling ...”	Same framework as the Swedish version, the name of the activity was changed to “Closing round” in the Australian version

It is recommended that two to three professionals are involved in leading each KONTAKT© group (trainers), with at least one trainer receiving methodological training in KONTAKT© and being experienced in working with children/adolescents with ASD. During KONTAKT© sessions trainers provide positive and constructive feedback to participants, specifically modelling how constructive criticism can be delivered appropriately. Directly aligning theory with practice, KONTAKT© encourages participants to work on their individual difficulties and goals, emphasizing the importance of repetition and reinforcement of learnt skills through involving parents and applying elements of cognitive behaviour therapy (CBT) such as psychoeducation, behaviour activation and observational learning (Bölte 2018). KONTAKT© incorporates parent feedback sessions, aligned with the first, middle and final sessions of the program. Parent sessions are designed to provide parents and trainers with the opportunity to exchange feedback on participants' progress both within and outside the group, allowing parents to meet, and exchange experiences and emotional and practical support.

In this study KONTAKT© was delivered to two groups of adolescents with ASD, across two school terms of 10 weeks each (with eight sessions delivered per term) from July to December 2017. As outlined in the KONTAKT© manual (Bölte 2018) weekly sessions were 90-min in duration and were moderated by two clinicians trained in delivering KONTAKT© and experienced in working with youth with ASD. With sixteen 90-min sessions, each KONTAKT© group received 24 h of direct therapy. As sessions were run by two clinicians, this amount equates to 48 h direct therapy time. It was further estimated that each therapist spent 5.5 h in preparing and following up each group across the 16 sessions, bringing the total estimated therapy time per group to 53.5 h. To systematically assess the fidelity to the KONTAKT© trainer's manual on a session by session basis, at the end of each session, the trainers completed a fidelity checklist designed specifically for the purposes of this study. Evaluation of the trainer's fidelity checklists (see Appendix B) revealed that KONTAKT© sessions adhered to at least 86% of the manualised content, with the most commonly stated reason for deviating from the content being responding to participants needs within the group, with the main change being the type of group activities.

Setting

Given the ultimate goal of this study was to understand the feasibility of KONTAKT© in an Australian service delivery context, the 16-session variant was piloted in partnership with the Autism Association of Western Australia (AAWA). AAWA is a specialist organisation delivering a range of services for individuals with ASD across life span with over

700 health professional staff. KONTAKT© groups were held at two of the AAWA metropolitan centres, in Perth, Western Australia.

Participants

Following attendance at a free public lecture on SSGT interventions directed at parents of children and teenagers with ASD, 22 families with an adolescent with ASD expressed interest in participating in the study. A screening interview was administered at University facilities examining the participants eligibility in relation to the following inclusion criteria: (1) community diagnosis of ASD corroborated by Autism Diagnostic Observation Schedule 2nd edition (ADOS-2; Lord et al. 2012); (2) $IQ > 70$ as assessed by the Wechsler Abbreviated Intelligent Scale 2nd edition (WASI-II; Wechsler 2011); and (3) Self-reported intrinsic motivation to participate. Participants were excluded if they: (1) demonstrated aggressive or rule-breaking behaviour as assessed by parents report via the Child Behaviour Checklist (CBCL; Pandolfi et al. 2014); (2) had previously been clinically confirmed as engaging in self-injurious behaviours; (3) had insufficient English language skills. All of the enrolled families reported that at least one parent would be available to attend the three KONTAKT© parent sessions. All measures (screening and data collection time points), were administered by BA (M.Sc. [Psychology]), a trained and experienced researcher.

Of the 22 adolescents screened two were excluded, one on the basis of an $IQ < 70$ and the other on the basis of low intrinsic motivation to participate in the group. Three participants withdrew from the study prior to pre-test citing the travel distance to venues and competing school commitments as barriers to attending the KONTAKT© groups. The study commenced with 17 participants (12 males, 5 females) with an average age of $M = 14.09$ years ($SD = 1.43$). Eight participants demonstrated high levels of anxious behaviour and three high levels of depressive behaviour as assessed by the CBCL. All of the adolescents were born in and diagnosed with ASD in Australia with 10 diagnosed according to the DSM-5 (APA 2013) and seven according to DSM-IV (APA 2000), of whom one was diagnosed with Pervasive Developmental Disorder Not Otherwise Specified (PDD-NOS), three with "high functioning" autism (HFA), and three with Asperger's syndrome (AS). The sociodemographic and relevant clinical information of the adolescents, parents, and trainers are presented in Tables 4, 5 and 6, respectively.

Fourteen adolescents, 20 parents (representing all but one of the adolescent participants) and all the KONTAKT© trainers ($n = 10$) attended separate focus groups immediately following the completion of 16 KONTAKT© sessions.

Seventeen parents, three fathers, and 17 mothers, with an average age of $M = 47.41$ years ($SD = 5.51$) attended each

Table 4 Sociodemographic and clinical characteristics of the adolescents receiving KONTAKT© at pre-test

Adolescents' socio-demographic and clinical characteristics	n = 17
Age (years), M (SD)	14.09 (1.43)
Range (years)	12–17
Grade (main stream)	7–12 (secondary school)
Intelligence Quotient, M (SD)	104.00 (17.00)
Sex, n (%)	
Male	12 (70%)
Female	5 (30%)
Diagnosis, n (%)	
ASD ^a	10 (59%)
PDD-NOS ^b	1 (6%)
HFA ^b	3 (17%)
AS ^b	3 (17%)
Child behaviour checklist, n (%)	
Depressive behaviours	3 (17%)
Anxious behaviours	8 (47%)

ASD autism spectrum disorder, PDD-NOS pervasive developmental disorder not otherwise specified, HFA high functioning autism, AS Asperger syndrome

^aAccording to DSM-5

^bAccording to DSM-IV

Table 5 Demographic characteristics of the parents of the adolescents completing questionnaires at pre-test

Parents' socio-demographic characteristics	n = 17
Age (years), M (SD)	47.41 (5.51)
Range (years)	35–56
Parent's education (years), M (SD)	14.35 (2.15)
Sex, n (%)	
Male	3 (18%)
Female	14 (72%)
Income (family weekly income before tax in AUD ^a), n (%)	
< 1000	2 (12%)
1000–1999	5 (29%)
≥ 2000	10 (59%)
Ethnicity ^a , n (%)	
Oceanian	9 (53%)
South and East Europe	2 (12%)
North west Europe	4 (24%)
South Asian	2 (12%)

AUD: Australian dollars

^aCategorised based on Australian Bureau of Statistics (www.abs.gov.au)

assessment session. Parents reported that they were willing to attend the KONTAKT© parent sessions. All trainers were professionals working at AAWA with considerable

Table 6 Demographic characteristics of KONTAKT© trainers at pre-test

KONTAKT© trainers' socio-demographic characteristics	n = 10
Age (years), M (SD)	28.7 (4.34)
Range (years)	24–35
Work experience (years), mean (SD)	6.05 (3.58)
Experience working with individuals with ASD (years), M (SD)	5.8 (1.94)
Professional background, n (%)	
Occupational therapy	8 (80%)
Clinical psychology	1 (10%)
Education	1 (10%)

experience working with adolescents with ASD and having received three days intensive training in KONTAKT© from experienced KONTAKT© trainers from Sweden.

Ethical Considerations

Prior to participating in the screening interview adolescents with ASD and their parents expressing an interest in the KONTAKT© study were provided with information sheets and an opportunity to discuss their potential involvement in the study. Following the obtaining of informed consent from parents and assent from adolescents a screening interview was conducted. Ethical approval for this study was provided by the Curtin University Human Research Ethics Committee (Perth, Australia) prior to the study (HRE2017-0245).

Data Collection

Participants attended a screening session, during which the ADOS-2, WASI-II, CBCL and a sociodemographic questionnaire was completed. Following confirmation of eligibility participants were enrolled in the study with data collected at three-time points: pre-test (approximately 2 weeks before participating in KONTAKT©), post-test (immediately following KONTAKT©) and at follow-up (12 weeks after KONTAKT©) from parents and adolescents by a researcher not directly involved in delivering the KONTAKT© intervention. Focus group interviews were conducted at the two AAWA centres immediately after the last session with all stakeholders (trainers, adolescents and their parents), led by researchers not involved in the delivery of the KONTAKT© program.

Measures

Participants' sociodemographic (age, gender, socioeconomic status, ethnicity, educational background, and family weekly income before tax) and clinical characteristics (diagnosis,

IQ, depressive and anxious behaviours) were gathered during a screening session, prior to the first assessment session. Primary and secondary outcome measures were collected at pre-test, post-test and follow-up.

Primary Outcome Measure

Adolescents' personally meaningful social goals. Adolescents' achievement of their personally meaningful social goals were assessed via self-report Goal Attainment Scaling (GAS; Kiresuk and Sherman 1968; Kiresuk et al. 1994). Based on the guidelines suggested by Kiresuk et al. (1994) goals were established and calibrated during the pre-test interview in a collaboration between adolescents and a researcher experienced in working with adolescents with ASD. Achievement of these goals was scored via the GAS scoring system, with -2 indicating adolescents' current level of performance, -1 indicating expected progress, with 0 and $+1$ and $+2$ indicating progress beyond the expected level (Ruble et al. 2012). Visual supports and examples of social goals were provided to adolescents, prompting the tailoring of goals to their personal preferences (e.g. Goal: greeting a classmate. GAS goal: When entering class in the morning say "Hi" to at least one classmate three mornings a week, across two consecutive weeks). More information on the visual supports and further examples are presented in Appendix A.

Secondary Outcome Measures

Autistic Traits. Autistic traits were evaluated via parent proxy report using the 65-item SRS-2. The SRS-2 has been employed in previous studies involving Australian adolescents with ASD, quantifying their impairment in naturalistic social settings (Guastella et al. 2010). The SRS-2 is scored on a 4-point Likert scale, ranging from "not true (0)" to "almost always true (3)", supporting the calculation of a total score and five subscales (social awareness, social cognition, social communication, social motivation, and restricted interests and repetitive behaviour). As per previous studies with KONTAKT© and as recommended for research settings, this study used raw scores for comparison. Total scores range from 0 to 195 with a score of 54 and above indicative of mild to severe ASD related traits (Constantino and Gruber 2005). The SRS-2 has been established as having good to excellent psychometric properties (Aldridge et al. 2012; Bölte et al. 2008), having been widely used as the primary outcome measure in RCTs evaluating SSGT interventions in children and adolescents with ASD with the goal of capturing their impact on autistic traits, including in previous evaluations of KONTAKT© in Sweden (Choque Olsson et al. 2017; Corbett et al. 2017; Gabriels et al. 2015; Jonsson et al. 2019; Lerner and Mikami 2012; Vernon et al.

2018; White et al. 2013). Employing the SRS-2 provided the opportunity to compare findings from the present study with those of previous research evaluating the efficacy of the 12 and 24-session variants of KONTAKT© (Choque Olsson et al. 2017; Jonsson et al. 2019).

Interpersonal Efficacy. Adolescents' self-reported confidence in their ability to successfully perform interpersonal actions was assessed via the Circumplex Scale of Interpersonal Efficacy (CSIE; Locke and Sadler 2007). The CSIE is comprised of the octants of assert, distance, yield, and connect, with each octant progressively blending into two axial dimensions: "Agentic" or "Communal", for example, "speaking up" representing an assertive action, "getting them to leave me alone" a distancing action, and "telling them when I am annoyed" a combination of these two actions (Locke and Mitchell 2016). A higher score on the agentic dimension corresponds with adolescents' self-report of being more confident/strong as opposed to timid/scared, with higher scores on the communal dimension corresponding with adolescents' willingness to be engaging/open as opposed to competitive/guarded (Locke 2014). Each of the dimensions within the CSIE is calculated according to the instructions as provided by its developers (Locke 2014), with the use of the scale supported by established psychometric properties demonstrated in adolescents with ASD (Locke and Sadler 2007).

Loneliness. Adolescents' self-reported loneliness was measured via the Perth A-Loneliness Scale (PALs), evaluating the level of loneliness in young people across four dimensions (isolation, friendship and positive and negative attitudes towards solitude), via 24 items measured on a 6-point Likert scale ("never [1]" to "always [6]") with higher total scores indicating higher levels of loneliness and more negative attitudes towards solitude. The PALs has demonstrated high levels of reliability in Australian adolescents (Houghton et al. 2016).

Social Skills. Adolescent's emotion regulation and competency in social skills were assessed via parent-proxy report using the Emotion Regulation and Social Skills Questionnaire (ERSSQ; Beaumont and Sofronoff 2008). This 27-item instrument measures the frequency of effective engagement in social behaviours and competency in applying them (for example, "Chooses appropriate solutions to social problems" or "deals effectively with bullying") on a 5-point Likert scale ("never [0]" to "always [4]"). Scores range from 0–108 with higher scores indicating higher levels of social competency. The ERSSQ has demonstrated good internal consistency in youth with ASD (Beaumont and Sofronoff 2008) and has captured changes in emotion regulation and social competency in Australian children with ASD receiving SSGT (Beaumont et al. 2015).

Quality of Life (QoL). The QoL of participants was assessed via adolescent's self-report and parent proxy report

using Paediatric Quality of life Inventory™, version 4.0 (PedsQL™ 4.0). The PedsQL™ 4.0 supports calculation of a total score and four subscales (physical, emotional, social, and school functioning; Sheldrick et al. 2012; Varni et al. 1999). This 23-item measure, rates items on a 5-point Likert scale (“never [0]” to “almost always [5]”), with lower scores indicating better QoL. Despite the absence of an ASD specific module, this questionnaire has high validity and reliability in adolescents with ASD and has been used in adolescents with ASD in Australia (Jonsson et al. 2017; McStay et al. 2014; Thomas et al. 2018).

Everyday Emotional State was measured using Experience Sampling Method (ESM) via daily responses from the adolescents (Chen et al. 2014; Cordier et al. 2014; Zirkel et al. 2015) on a 5-item measure, specifically designed for the purposes of this study. This was distributed daily via texts to all adolescents from the first day of KONTAKT© to the follow-up time point (across approximately 9 months). The texts were sent once daily in the evening at a random time point between 5 to 8 PM with the text reading, “In the last 24 h, on a scale of 1 to 10 I have been feeling ...” and answers rated on a 10-point scale in regard to five dichotomised emotional sets (sad/happy, lonely/unlonely, angry/calm, scared/unafraid, and anxious/confident), with higher scores indicating a more positive emotional experience. This method has previously shown good reliability with adolescents without ASD (Roekel et al. 2014) and consistency in examining the effect of social context on the daily experiences of youth with ASD (Chen et al. 2014).

Facial Emotion Recognition and Gaze Patterns. Adolescents accuracy in recognising thirty-seven basic and complex emotions (six levels starting from basic emotions for age 4 to complex emotions for adults) was measured via stimuli selected from the Mindreading Battery (Junek 2007). Participants were asked to identify the emotions displayed by actors in 2–5 s silent coloured video clips, from a 4-choice list displayed. Word choices were randomly chosen from the entire Mind reading battery stimuli (excluding the target stimuli’s group). Participants gaze patterns and fixations were recorded via a Remote Eye Tracker Device (RED) developed by SensoMotoric Instruments (SMI SensoMotoric Instruments 2015). Four areas of interest (AOIs) were dynamically defined for each stimuli video, including the forehead, eyes, nose and mouth. Outcomes were assessed in relation to accuracy of and time to respond, and duration of time spent fixating on AOIs (Louwerse et al. 2013; Grynszpan et al. 2012).

Social Anxiety. Adolescents’ self-reported anxiety in social situations was measured via the 20-item Social Interaction Anxiety Scale (SIAS) rated on a 5-point scale (“Not at all” [0] to “extremely” [4]) with scores ranging from 0–80, with higher scores representing greater anxiety in social situations. The SIAS has demonstrated good

internal consistency and test–retest reliability (Mattick and Clarke 1998), having been employed in evaluating the impact of SSGT interventions, capturing a decrease in social anxiety following the intervention (Matthews et al. 2018; Schohl et al. 2014).

Adverse Events. The potential adverse and unwanted events associated with attending KONTAKT© were evaluated using the Negative Incidents and Effects of Psychological Treatment (NEQ), via adolescent self-report at post-test and follow-up. The NEQ required adolescents to rate any adverse or unwanted events they experienced during the intervention period and attribute their causality to either the program or external circumstances. This 32-item questionnaire was measured on a 5-point Likert scale (“Not at all” [0] to “Extremely” [4]), supporting the calculation of a total score and six subscales (symptoms, quality, dependency, stigma, hopelessness and failure; Rozental et al. 2016). Higher scores were indicative of the experience of more adverse events. The NEQ has shown good reliability (Rozental et al. 2016).

Focus Groups

To date a paucity of research has considered the experiences of the individuals with ASD themselves in assessing the feasibility of SSGT interventions (Choque Olsson et al. 2016a, b). In addressing this limitation, the present study, conducted focus groups with the adolescents with ASD, their parents and the trainers involved in delivering KONTAKT©, capturing their thoughts in regard to their experiences with KONTAKT©. A discussion guide ensured similar topics were discussed across all stakeholder groups (Table 7) supporting further tailoring of KONTAKT© to the Australian context. All focus groups were conducted face-to-face at the two AAWA centres and were facilitated by six researchers not involved in the delivery of the KONTAKT© intervention but experienced in conducting focus groups. Discussions ranged in duration from 30 to 90 min, were digitally recorded and transcribed verbatim in preparation for analysis.

Step 3: Refining and Finalising the Program for an Australian Context

The final step in the present study involved final revisions of the 16-session variant of the KONTAKT© manual and workbooks. The experiences of all stakeholders expressed during the focus groups indicated the modifications and additions necessary in improving the acceptability of KONTAKT© within an Australian context.

Table 7 Focus group discussion guide used to guide focus groups with KONTAKT© stakeholder groups

We would like to ask you some questions relating to your experience of the KONTAKT© social skills training program. Please answer the following questions to the best of your ability, providing examples where appropriate

1. What was your experience of the KONTAKT© social skills training program?
2. During the social skills group training, which parts of the program were easier for you/your child/the participants to do? (*for example, role play activities, group activities, problem solving, games, the opening round, the closing round, homework assignments, emotion recognition or expression activities*)
3. During the social skills group training, which parts of the program were less easy for you/your child/the participants to do? (*for example, role play activities, group activities, problem solving, games, the opening round, the closing round, homework assignments, emotion recognition or expression activities*)
4. Do you think that there were any topics missing in KONTAKT©, either in the themed discussions or group exercises?
5. Were there any social skills that you/your child/the participants wanted to practice in their everyday lives as part of the homework assignments?
6. Do you think that attending KONTAKT© impacted on your/your child's/the participant's everyday social life? If so, how?
7. How could KONTAKT© be improved for future participants? Is there any aspect of the program you would like to see changed?
8. Do you have any other comments or anything you would like to raise that we have not discussed in relation to the KONTAKT© program?

Data Analysis

Data management and analysis was supported by Version 24.0 of the Statistical Package for Social Sciences (SPSS-24) for windows (IBM Corp. 2016). A random effects regression model (linear mixed model) was used with the dependent variable being the GAS goal score (primary outcome) and independent variables being: time (post-intervention and follow-up), age, IQ, gender, centre, and depressive or anxious behaviour. The random effect was the participant identifier (accounting for the correlation between multiple observations on the same individual). Following convention, a p -value < 0.05 was taken to indicate a statistically significant association in all tests.

Qualitative data from the focus groups were transcribed verbatim, with analysis supported by Nvivo 12 (QSR International 2018), following a Thematic Analysis Approach (Braun and Clarke 2006) with the aim of identifying meaningful comments related to feasibility of KONTAKT©.

Results

Step 1: Cultural Adaptation and Language Translation

Given previous research demonstrating that the longer 24-session variant of KONTAKT© was more effective than the shorter 12-session variant it was initially envisaged that the longer 24-session version of KONTAKT© would be adapted to the Australian context (Fig. 1). However, following consultation with the working group and Australian clinical partners, an intermediate 16-session variant of KONTAKT© was developed. This adaptation was significantly influenced by the perceived need to align KONTAKT© with the structure of the Australian school year,

which is standardised nationally to run across four 10-week terms. Therefore, it was determined that in the Australian context KONTAKT© would run in two eight session blocks, across two school terms. The content of the 16-session variant of KONTAKT© encompasses the 12-session variant with the addition of four sessions moderated by adolescents. The 16-session program incorporates three parent sessions, aligned with sessions one, eight, and 16, with session nine held in a coffee shop or cafe with the goal of encouraging adolescents to practice their social skills in a naturalistic context (Bölte 2018).

Step 2: Feasibility Study

Of the 17 adolescents enrolled in the study one withdrew after two KONTAKT© sessions, citing travel distance as a barrier, with 16 participants (94%) completing the KONTAKT© program and data collection to follow-up. While the majority of participants completed all assessments in person at a university laboratory ($n = 13$), one participant returned both the post-test and follow-up questionnaires via email (citing travel distance as a barrier), with two others attending the post-test in person but returning the follow-up assessments via email and postal mail, citing sickness and relocation to another city as a barrier. As such emotion recognition data was not obtained for one participant at post-test and three participants at follow-up, as this could be collected in the university laboratory only.

Quantitative Findings

Application of the fitted random effects regression model (linear mixed model) using assessment timeline as a fixed effect demonstrated that age, IQ, gender, centre, depressive and anxious behaviour did not significantly impact any of the dependent variables (primary or secondary outcomes).

KONTAKT variant	Sessions																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
12-Sessions																								
Parent session	●					●						●												
Excursion																								
Adolescent-led																								
Trainer led	●	●	●	●	●	●	●	●	●	●	●	●												
16-Sessions																								
Parent session	●							●																●
Excursion									●															
Adolescent-led												●	●	●	●									
Trainer led	●	●	●	●	●	●	●	●	●	●	●													●
24-Sessions																								
Parent session	●					●						●	●						●					●
Excursion																		●						
Adolescent-led															●	●	●		●	●	●	●	●	●
Trainer led	●	●	●	●	●	●	●	●	●	●	●	●	●				●							●

Fig. 1 Outline of the structure of the 12, 16 and 24 session variants of KONTAKT© (Bölte 2018)

Almost all adolescents achieved their self-reported personally meaningful social goals (primary outcome) at post-test (ES = 1.69; $p < 0.001$), maintaining this achievement at follow-up (ES = 1.59; $p < 0.001$). On secondary outcomes all parent proxy report measures, with the exception of QoL showed significant improvements between pre-test and post-test. Parents reported a significant reduction in autism related traits on the SRS-2 total score at post-test (ES = 0.9; $p = 0.001$) and follow-up (ES = 0.93; $p = 0.001$), with large effects evident on the social communication and interaction subscale at post-test (ES = 0.89; $p = 0.001$), which continued to improve at follow-up (ES = 0.94; $p = 0.001$). According to ERSSQ, parents also reported a significant change in their child’s emotion regulation and social abilities at post-test (ES = 0.82; $p < 0.001$) with a slight reduction in effect observed at follow-up (ES = 0.67; $p < 0.001$).

Adolescents’ self-reported everyday emotional state captured via ESM demonstrated they felt less afraid (ES = 1.03; $p < 0.001$) and lonely (ES = 0.5; $p < 0.001$), and more confident (ES = 1.02; $p < 0.001$) during the intervention period compared to after KONTAKT© had ended. The adolescents felt happier on weekends both within and outside the intervention period (ES = 0.60; $p = 0.016$). While there was no statistically significant change in the participant’s interpersonal efficacy as assessed by the two dimensional axes of the CSIE across the intervention period, participants showed improvements in how confident they felt in being: (1) assertive and forceful in keeping the upper hand (follow-up: ES = 0.62; $p = 0.18$); (2) guarded toward others (post-test: ES = 0.64; $p = 0.015$; follow up: ES = 0.53; $p = 0.043$); (3) capable of avoiding ridicule and rejection (post-test: ES = 0.59; $p = 0.025$; follow up: ES = 0.53;

$p = 0.041$); (4) going along with what others say (post-test: ES = 0.59; $p = 0.025$; follow-up: ES = 0.87; $p = 0.002$); (5) avoiding conflict (post-test: ES = 0.63; $p = 0.017$; follow up: ES = 0.53; $p = 0.041$); and, (6) capable of getting others to like them (post-test: ES = 0.58; $p = 0.029$). According to the PALs, there was a significant increase in the adolescents’ negative attitudes towards solitude at post-test (ES = 0.54; $p = 0.039$), but this was not apparent at follow-up ($p > 0.5$). There was a significant improvement in adolescent’s ability to recognise emotions at both post-test (ES = 0.71; $p = 0.021$) and follow-up (ES = 0.68; $p = 0.022$) in comparison to baseline, with significant reductions in answering time at follow-up (ES = 0.69; $p < 0.001$). There was no significant change between baseline and post-test or follow-up on other secondary outcomes. The result of the linear mixed methods model is presented in Table 8.

Overall, 11 (65%) adolescents reported experiencing at least one negative effect during the program, with quality (e.g. always understanding the program and the trainers) ($n = 11$, 65%) and symptoms ($n = 6$, 35%) such as anxiety, depression being the most frequent negative effect attributed to KONTAKT©. The other negative effects reported were dependency on the program and trainers ($n = 4$, 24%), and feelings of hopeless and failure ($n = 3$, 18%). Only two (12%) adolescents felt stigmatized by attending the group.

Focus Groups

Thematic analysis of data from the focus groups revealed three overarching themes inclusive of nine sub-themes: Experience with KONTAKT©, Impact on everyday social

Table 8 Means, standard deviations with mixed model method examining changes in primary and secondary outcome measures of adolescent attending the KONTAKT© program

Measure	Assessment point	Mean difference from pre-test	95% Confidence interval	p	ES
Primary measure					
GAS ^a	Post	2.27	2.96 to 1.58	0.000***	1.69
	Follow-up	2.12	2.81 to 1.44	0.000***	1.59
Secondary measures					
SRS-2^b					
Total	Post	- 15.18	- 6.53 to - 23.82	0.001**	0.90
	Follow-up	- 15.31	- 6.87 to - 23.75	0.001**	0.93
Social awareness	Post	- 1.31	- 0.20 to - 2.82	0.086	0.44
	Follow-up	- 2.00	- 0.52 to - 3.47	0.010**	0.69
Social communication	Post	- 6.51	- 2.91 to - 10.11	0.001**	0.92
	Follow-up	- 6.37	- 2.86 to - 9.89	0.001**	0.93
Social motivation	Post	- 2.63	0.889 to 4.496	0.005**	0.75
	Follow-up	- 2.62	0.864 to 4.386	0.005**	0.76
Social communication and interaction	Post	- 12.71	- 5.43 to - 19.99	0.001**	0.89
	Follow up	- 13.00	- 5.89 to - 20.11	0.001**	0.94
CSIE^a					
Assert & distant	Post	1.00	2.04 to 0.04	0.59	0.49
	Follow up	1.26	2.30 to 0.23	0.018*	0.62
Distant	Post	1.5	2.69 to 0.31	0.015*	0.64
	Follow up	1.23	2.42 to 0.44	0.043*	0.53
Yield and distant	Post	0.91	1.69 to 0.13	0.025*	0.59
	Follow up	1.33	2.11 to 0.55	0.002**	0.87
Yield	Post	1.20	2.18 to 0.23	0.017*	0.63
	Follow up	1.02	1.99 to 0.04	0.041*	0.53
Yield and connect	Post	1.13	2.12 to 1.26	0.029*	0.58
	Follow up	0.42	1.42 to 0.58	0.395	0.22
PALS^b					
Negative attitude to solitude	Post	2.38	0.13 to 4.62	0.039*	0.54
	Follow up	- 0.80	- 3.10 to 1.50	0.481	0.18
ERSSQ^a					
Total	Post	12.63	7.83 to 17.42	0.000***	0.82
	Follow up	10.72	5.81 to 15.62	0.000***	0.67
ESM^a					
Happy/sad	Weekday	- 0.16	- 0.29 to - 0.03	0.016*	0.60
Lonely/unlonely	Intervention time	0.13	0.26 to 0.001	0.048*	0.50
Afraid/unafraid	Intervention time	0.29	0.42 to 0.15	0.000***	1.03
Confident/anxious	Intervention time	0.33	0.48 to 0.17	0.000***	1.02
ER					
Accuracy ^a	Post	0.07	0.011 to 0.135	0.021*	0.71
	Follow up	0.07	0.010 to 0.134	0.022*	0.68
Answering time ^b	Post	- 1.19	- 3.316 to 0.930	0.270	0.33
	Follow up	- 5.16	3.029 to 7.291	0.000***	0.69

CSIE circumplex scale of interpersonal efficacy, ER emotion recognition, ERSSQ emotion regulation and social skills questionnaire, ES effect size, ESM experience sampling method, GAS goal attainment scaling, PALS Perth A-loneliness Scale, SRS-2 social responsive scale

^aIncreasing scores = improvement

^bDecreasing scores = improvement

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

life and KONTAKT[®]'s structure and content. These are summarised in Table 9.

All adolescents, with the exclusion of one, reported that they 'had fun' during the KONTAKT[®] sessions, 'learning new fun things' and expressing that they had made 'good connections' with the other group members: "For me it's great to see all of you [other KONTAKT participants]. When I walk in here, I'm just like, "yeah!" (Adolescent -male).

Adolescents expressed that as a result of attending KONTAKT[®] they felt more confident in engaging in social situations and making new friends. Adolescents referred to their fellow KONTAKT[®] participants as friends:

Well, I actually think the KONTAKT[®] group is pretty fun. And it lets me be myself and lets my individuality show! (Adolescent -male)

All adolescents reported they had been successful in making at least one friend within or outside their KONTAKT[®] group. While younger adolescents more generally described the impact of KONTAKT[®] on their social skills and communication, older adolescents emphasized the importance of the KONTAKT[®] groups in providing a safe place to talk with and be together with other adolescents with ASD.

[In the KONTAKT[®] group] you can say your opinions, because at school you say your opinion and everyone's like, "No!" (Adolescent -male)

[At KONTAKT[®]] I can be myself and let my individuality show. I am around people that are similar to me. (Adolescent -female)

Both parents and trainers reflected the adolescents view that KONTAKT[®] had been a success, however some parents reported that their role in the program was at times unclear:

I felt a little bit disconnected [from KONTAKT[®]]. (Parent)

[Parents are] not that clear about what the parent role is. So, they were just given some general information rather than focusing on what they should do. (Trainer)

In the present study only one participant commencing the KONTAKT[®] study, dropped out of the intervention suggesting that participating in KONTAKT[®] was valued by the participants. In the Australian service delivery context there is a paucity of evidence-based SSGT interventions available for adolescents with ASD, a reality evidenced in the qualitative data obtained as part of the present study, with one parent explaining: "My daughter is desperate for something similar to continue, because she's really enjoyed it, but really there is nothing else" (Parent). Collectively, evidence from this feasibility study suggested that there was likely a high level of demand for the KONTAKT[®] with the Australian service delivery context.

All trainers delivering the KONTAKT[®] program in this study received three days intensive face-to-face training from Swedish clinicians experienced in facilitating KONTAKT[®] and training KONTAKT[®] trainers. Trainers were further supervised monthly, via Skype and as needed by email, by two Swedish clinicians experienced in delivering KONTAKT[®] in Sweden. In achieving full certification as a KONTAKT[®] trainer Australian trainers led a KONTAKT[®] group under monthly supervision, achieving intervention fidelity as assessed by the evaluation of three video recorded fully moderated sessions, by a certified Swedish trainer.

Analysis of the qualitative data revealed that overall, all but one of the adolescents had a positive experience of KONTAKT[®], a finding further evidenced in the high attendance rate with the majority of adolescents (86%) attending at least 14 of the 16 sessions (Borrelli 2011). The participant reporting a more negative experience with KONTAKT[®] expressed that he felt he already knew most of the skills practiced within the sessions, and there was "nothing new" for him to learn. While this participant stated the he felt "miserable" during the sessions, he also reported that he found KONTAKT[®] "a good program":

Well, I mean it's just a good place to come ..., a place for parents to help their kids when they're off for the day. You can do the exact same thing with a psychologist, but this way the parents can go with their kids. (Adolescent - male)

Trainers enjoyed leading the KONTAKT[®] groups, experiencing the program as fun, feeling that participants were engaged in the sessions:

"It went really well. I think we really enjoyed it. We've certainly seen some good games. I think the kids are more engaged, than I thought they would be at the start of the session, I think. They've been more willing to do homework." (Trainer)

Parents also positively experienced KONTAKT[®], expressing that they wished the program was longer or could be followed-up with booster sessions, as their children expressed sadness that the program ended:

He's always looked forward to coming. He's enjoyed it. He's sad that it's going to end. (Parent)

All stakeholders (parent, adolescents and trainers) expressed that some of the discussion topics were less relevant to the participants, that the content would benefit from being more flexible and the inclusion of topics based on the interests and priorities of the participants. More than half of all the stakeholders believed that completing homework during the week was challenging, evidenced by only a few of the adolescents doing their homework every week. Further stakeholder suggestions included a greater number of

Table 9 Themes emerging from adolescents, parents and trainers focus groups on their experience of KONTAKT© at post-test

Themes	Subthemes	Quote
Experience with the group	Friendship and connectivity	“I met [the other KONTAKT© participants], and my first thought was, ‘I wanna become friends with these kids, because they’re like me a little’” (Adolescent-male)
		“She’s very excited to try and keep the [KONTAKT©] friendships going” (Parent)
		“He has talked to many new people and made some friends” (Parent)
	A sense of safety and belonging	“[The KONTAKT© participants have] all got different interests ... but they’re all still making friends” (Trainer)
		“I think [the KONTAKT© participants] all get along so well, because we have something in common” (Adolescent-male)
		“My son feels like he’s a secret agent all the time at school. He doesn’t let people know he has autism ... I walked into the KONTAKT© room and saw the boys just acting as teenage boys, to me, that just made my day” (Parent)
Gender mix of the groups	“In our KONTAKT© sessions, it was like everyone just starts chatting” (Trainer)	
	“It would’ve helped if we had a male KONTAKT© trainer” (Adolescent-male)	
	“I’m glad there were some girls in the KONTAKT© group” (Adolescent-female)	
	“I think that one of the main effects is being a mix sex group, because it usually is all boys” (Parent)	
Impact on everyday social life	Confidence	“A really good mix with boys and girls ... so we actually had some very good conversations around what do you ask a girl!” (Trainer)
		“Last week at school I suddenly felt like, Wow! I’m a lot more confident than I used to be” (Adolescent-male)
		“He feels more confident to travel into town and negotiate with others like any normal boy” (Parent)
	Social skills	“She now feels like she is just a typical teenager now” (Trainer)
		“[KONTAKT©] helped me with my friends and stuff, because now I’m gonna catch up with them during the holidays” (Adolescent-male)
		“She talked to people who she had never met before ... She actually engaged in a conversation with them” (Parent)
		“She went to a friend’s house, and asked the Mum, ‘How has your day been?’ The Mum said, ‘My kids don’t ask me how my day has been ... We had a whole conversation about my day.’ ... [As a result of KONTAKT©], she changed a bit more than what I thought she was going to” (Parent)
		“He will sit and tell me, ‘I learned nothing,’ but I can see there’s been some really positive changes in terms of some of the things that he hasn’t done before” (Parent)
		“He [a KONTAKT© participant] has made a friend, established a rock band. He sent me a video of them playing together” (Trainer)
		“She’s [a KONTAKT© participant] actually just developed her own creative writing group that friends at school are joining in” (Trainer)
“One of our [KONTAKT© participants] for the first time ever went to the movies with a group of his friends” (Trainer)		

Table 9 (continued)

Themes	Subthemes	Quote
KONTAKT's Structure and content	Discussion round	"Some of the topics we wanted to talk about didn't get discussed" (Adolescent-male)
		"To be honest I didn't really mind what the group discussion is, I just kind of like sharing my stories" (Adolescent-male)
		"Relationships with the opposite sex ... well, we all thought it should be covered" (Parent)
		"One of the sessions is around explaining autism and talking about it from a stranger's point of view, and I think our KONTAKT© group found that really important" (Trainer)
		"Sometimes I find the themed discussion difficult. Being quite set in what you have to discuss, sometimes it wasn't really relevant or they weren't motivated about it" (Trainer)
		"It would've been nice to have more direction, I guess, in terms of the discussions in particular" (Trainer)
	Homework	"The same question, same layout, just slightly different questions ... It was so boring and easy. It was repetitive as well" (Adolescent-male)
		"Because we wouldn't run into those situations the homework was about" (Adolescent-male)
		"The whole process of holding a pen and writing is exhausting for him" (Parent)
		"I found that getting my child to do the homework was quite hard" (Parent)
		"There's still a couple that don't want to do homework, but we've certainly had students that were quite happy to do their homework and then share it with the group" (Trainer)
		"I think some parts are quite hard ... they need more examples in the workbook" (Trainer)
Parents' role	"I think the tricky thing is, it's the writing element of it that they don't like doing" (Trainer)	
	"I felt a little bit disconnected. I didn't feel that there was not as much feedback given that I could use to guide my child" (Parent)	
	"Something like, 'This is the basic stuff we covered. These are the things that we've encouraged the children to practice this week,' and then we could try to incorporate it into the week" (Parent)	
	"Email[ing] the parents the homework or something might help" (Trainer)	
	"Talking to a parent, she was like, 'Oh, I had no idea that he was supposed to be doing stuff at home.'" (Trainer)	
	"More effort to kind of, catch up with the parents" (Trainer)	
Real life exposure	"We're not that clear about what the parent role is. So, they were just given some general information rather than focusing on what they should do" (Trainer)	
	"What we were doing there, we were making new friends and we were doing all that good stuff, so why wouldn't we have another two or three excursions just to do it again?" (Adolescent- male)	
	"The excursion was amazing, I loved that excursion!" (Adolescent-male)	
	"What I would do is instead of discussing the topic, maybe actually try it" (Adolescent-male)	
	"Super motivated by the group excursion. It was one of the first days that he actually just sat with the group" (Trainer)	
	"I think they need more opportunities to apply what they're actually learning" (Trainer)	
		"Maybe activities that apply more to their life or something" (Trainer)

opportunities to practice social skills in real-life situations, such as during excursions. While trainers were generally happy with the manual and program, they requested that more information and examples be included in the manual, particularly in regard to the discussion round.

Step 3: Refining and Finalising KONTAKT© for an Australian Context

Overall, findings from this feasibility study support the conclusion that KONTAKT© was acceptable and highly valued

by all the stakeholders. However, findings suggest that the acceptability of KONTAKT© could be improved by several minor modifications including: adding a pre-KONTAKT© interview session for the purposes of establishing personally meaningful social goals guided by GAS and establishing rapport; individually tailoring homework assignments to align with participant's GAS goals; developing a framework for the discussion round; allowing more flexibility and providing greater choice in relation to the group activities, and including more social games typical to Australian adolescents in the trainers manual; and, providing more concrete examples of the sessions not detailed in the activity books.

Discussion

Although there are several SSGT interventions designed for adolescents with ASD, to date none have been evaluated for an Australian context and its unique cultural diversity. The purpose of this study was to systematically assess the feasibility and cross-cultural validity of a 16-session variant of KONTAKT© for adolescents with ASD in an Australian context. The results of the focus groups demonstrated that KONTAKT© was robust, providing a framework readily transferable to the Australian cultural context. Findings from this study support further understanding of KONTAKT©'s feasibility as aligned with Bowen et al. (2009) focus areas: (1) adolescent, parent and trainers' satisfaction with the program (*acceptability*); (2) degree of expressed interest or intention to attend KONTAKT© (*demand*); (3) success/failure and factors affecting the implementation of KONTAKT© (*implementation*); (4) comparison of the outcomes of KONTAKT© in Sweden with that of the present Australian study, particularly in regards to the SRS-2 (*adaptation*); (5) the perceived sustainability of KONTAKT© within the Australian service delivery system (*integration*); (6) the potential fit of KONTAKT© with Australian service providers' needs and goals (*expansion*); and (7) the preliminary efficacy of KONTAKT© within the Australian system.

During this feasibility study, expressions of interest for the anticipated future RCT evaluation of KONTAKT© were received from more than 300 families living within the Perth metropolitan area, indicating a current demand for such intervention (*demand*). This is in line with the high level of demand of individuals with ASD seeking evidence-based interventions (Autism in Australia 2017). In partnering with an established service provider (AAWA), and in parallel with training the KONTAKT© trainers directly involved in the delivery of the two groups evaluated within this study, a further 25 trainers from AAWA attended the three-day intensive KONTAKT© training course. While only seven of these trainers achieved certification KONTAKT© as part of the present study, AAWA envisaged that many more of these

trainers would achieve certification during the planned RCT and continue to deliver KONTAKT© (*Integration*).

The High attendance (87%) and the low drop-out rate (6%) of participants, combined with the high achievement of personally meaningful social goals demonstrated that the delivery of KONTAKT© is likely to be feasible in an Australian context (*Adaptation*) as it was in Sweden (Choque Olsson et al. 2017; Jonsson et al. 2019). In addition to the high levels of achievement of personally meaningful social goals and improvements in adolescents' self-reported daily sampled quality of life, parents reported a significant reduction in their children's autism related symptoms at post-test and follow-up. This is in line with evaluations of the short and long variants of KONTAKT© in Sweden (Choque Olsson et al. 2017; Jonsson et al. 2019), which also observed improvements in participants social skills functioning, reporting more outings with friends following the intervention period. Similar to the Swedish feasibility study of KONTAKT© (Choque Olsson et al. 2016a, b), as assessed by the fidelity checklists, the trainers were able to adhere to most of the KONTAKT© sessions' manualised content, with minor suggestions for change reflecting a tailoring of group activities to the participant's level of functioning (*Implementation*).

All stakeholders (adolescents, their parents and the trainers) reported high levels of satisfaction and acceptability of KONTAKT© (*Acceptability*). Consistent with the experiences of similar groups attending KONTAKT© in Sweden (Choque Olsson et al. 2016a, b), stakeholders had a positive experience of the program, with adolescents feeling that their social communication and confidence improved due to their participation in the intervention. These findings reiterate the acceptability and cross-cultural adaptability of KONTAKT© in an Australian context. This was further evidenced through the alignment of KONTAKT© with AAWA's goals and culture (*Expansion*), and the trainer's suggestions of only minor modifications in relation to providing more structure and information in the discussion round and group activities, facilitating consistency across locations and efficiencies in preparation time. Stakeholders also identified several areas for improvement including: (1) more detailed descriptions of activity options with scripts for delivery (trainers); (2) outlining strategies for facilitating discussion among the participants (trainers); (3) trainers providing direct feedback to parents rather relying on communication between adolescents and their parents (parents); and, (4) developing more engaging homework (all stakeholders).

Despite these positive findings, in interpreting the findings from this study, several limitations should be considered. This study employed an uncontrolled single group pre-test post-test design with only a small sample of 16 participants completing the study, without blinding of either participants or researchers, limiting generalizability of our

findings and requiring confirmation in a larger controlled trial. In addressing this limitation further evaluation of the 16-session variant of KONAKT© in the Australian context via a well-designed RCT is currently underway to further understand its efficacy in this context (Afsharnejad et al. 2019). The design of this RCT study addresses many of the limitations of previous research in this field, which have failed to control for the potentially confounding effect of a mere exposure to a socially enjoyable context (Choque Olsson et al. 2017; Corbett et al. 2016; Jonsson et al. 2019; Laugeson et al. 2009; Schohl et al. 2014; Vernon et al. 2018; White et al. 2013; Yoo et al. 2014), employing an active control group (a manualized cooking program), with blind assessment of outcome variables and the inclusion of cost utility analysis. Findings from this RCT will enable an understanding of both the efficacy of SSGT interventions in adolescents with ASD and investigation of the relationship between dose and response (number of sessions and changes in outcomes) of social skills training programs via comparison with previous evaluations of KONAKT© conducted in Sweden.

Conclusion

This feasibility study resulted in finalisation of a 16-session variant of KONAKT© tailored to the Australian context. This study also employed, for the first time, a measurement framework focused on understanding the efficacy of a SSGT program in improving the personally meaningful social goals of adolescents themselves. Findings suggest that the measurement framework employed was indeed robust, that obtaining the views of adolescents with ASD themselves is possible, and likely to be suitable in a larger efficacy trial. While further investigation is required to understand the true efficacy of KONAKT© within an Australian context this study provides evidence that delivery of such interventions within an Australian service provider is possible.

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Author Contributions Conceptualisation and design of the study was undertaken by BA, SG, SB, MF and TA. TA and KM assist with administration of groups and offer clinical support. Assessments used were chosen by BA, SG, SB, MF, MB, NC, CC and AF. Analysis of pilot data was undertaken by BA with assistance from SG, MF, MB, SB and NC. Drafting of the manuscript was undertaken by BA with input from SB, SG, MF, MB, SB, CC, AF. FL provided consultation for cost analysis. All authors contributed to, read and approved the final manuscript.

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Compliance with Ethical Standards

Conflict of interest The authors declare that they have no conflict of interest. Sven Bölte receives royalties from Hogrefe publishers for the German and Swedish KONAKT© manuals and the Swedish KONAKT© Activity books. This research is conducted independent from the service provider with no competing interest.

References

- Afsharnejad, B., Falkmer, M., Black, M. H., Alach, T., Lenhard, F., Fridell, A., ... Girdler, S. (2019). KONAKT© in Australian adolescents on the autism spectrum: Protocol of a randomized controlled trial. *Trials*, 20, 687. <https://doi.org/10.1186/s13063-019-3721-9>.
- Aldridge, F. J., Gibbs, V. M., Schmidhofer, K., & Williams, M. (2012). Investigating the clinical usefulness of the Social Responsiveness Scale (SRS) in a tertiary level, autism spectrum disorder specific assessment clinic. *Journal of Autism and Developmental Disorders*, 42(2), 94–300. <https://doi.org/10.1007/s10803-011-1242-9>.
- American Psychological Association. (2000). *Diagnostic and statistical manual of mental disorders* (4th ed.). Washington, DC: American Psychiatric Association.
- American Psychological Association. (2013). *Diagnostic and statistical manual of mental disorders: fifth edition (DSM-5)*. Washington, DC: American Psychiatric Association.
- Attwood, T. (2000). Strategies for improving the social integration of children with Asperger syndrome. *Autism*, 4(1), 85–100. <https://doi.org/10.1177/1362361300004001006>.
- Australian Bureau of Statistics. (2012). *Cultural diversity in Australia—Reflecting a Nation: Stories from the 2011 Census, 2012–2013*. Retrieved from <https://www.abs.gov.au/ausstats/abs@.nsf/Lookup/2071.0main+features902012-2013>.
- Australian Institute of Health and Welfare (AIHW). (2012). Autism in Australia. Retrieved from <https://www.abs.gov.au/AUSSTATS/abs@.nsf/Latestproducts/4428.0Main%20Features32012?opendocument&tabname=Summary&prodno=4428.0&issue=2012&num=&view=>.
- Australian Institute of Health and Welfare (AIHW). (2017). Autism in Australia. Retrieved from <https://www.aihw.gov.au/reports/disability/autism-in-australia/contents/autism>.
- Barrera, M. J., Castro, F. G., Strycker, L. A., & Toobert, D. J. (2013). Cultural adaptations of behavioral health interventions: A progress report. *Journal of Consulting and Clinical Psychology*, 81(2), 196–205. <https://doi.org/10.1037/a0027085>.
- Beaumont, R., Rotolone, C., & Sofronoff, K. (2015). The secret agent society social skills program for children with high-functioning autism spectrum disorders: A comparison of two school variants. *Psychology in the Schools*, 52(4), 390–402. <https://doi.org/10.1002/pits.21831>.
- Beaumont, R., & Sofronoff, K. (2008). A multi-component social skills intervention for children with Asperger syndrome: The junior detective training program. *Journal of Child Psychology and Psychiatry*, 49(7), 743–753. <https://doi.org/10.1111/j.1469-7610.2008.01920.x>.
- Bernal, G., Jiménez-Chafey, M. I., & Domenech Rodríguez, M. M. (2009). Cultural adaptation of treatments: A resource for considering culture in evidence-based practice. *Professional Psychology: Research and Practice*, 40(4), 361–368. <https://doi.org/10.1037/a0016401>.

- Betts, K. (2003). Birthplace origins of Australia's immigrants. *People and Place*, 11(3), 51–57.
- Blythe LaGasse, A. (2013). Pilot and feasibility studies: Application in music intervention research. *Journal of Music Intervention*, 50(4), 304–320. <https://doi.org/10.1093/jmt/50.4.304>.
- Bölte, S. (2018). *Social färdighetsträning i grupp med fokus på kommunikation och social interaktion vid autismspektrumtillstånd enligt Frankfurtmodellen (KONTAKT)*. Göttingen: HOGREFE.
- Bölte, S., & Choque-Olsson, N. (2011). *KONTAKT (Swedish version)*. Stockholm: HOGREFE.
- Bölte, S., Poustka, F., & Constantino, J. N. (2008). Assessing autistic traits: Cross-cultural validation of the social responsiveness scale (SRS). *Autism Research*, 1(6), 354–363. <https://doi.org/10.1002/aur.49>.
- Bölte, S., Schipper, E., Robison, J. E., Wong, V. C. N., Selb, M., Singhal, N., ... Zwaigenbaum, L. (2014). Classification of functioning and impairment: The development of ICF core sets for autism spectrum disorder. *Autism Research*, 7(1), 167–172. <https://doi.org/10.1002/aur.1335>.
- Borrelli, B. (2011). The assessment, monitoring, and enhancement of treatment fidelity in public health clinical trials. *Journal of Public Health Dentistry*, 71(s1), S52–S63. <https://doi.org/10.1111/j.1752-7325.2011.00233.x>.
- Bowen, D. J., Kreuter, M., Spring, B., Cofta-Woerpel, L., Linnan, L., Weiner, D., ... Fernandez, M. (2009). How we design feasibility studies. *American Journal of Preventive Medicine*, 36(5), 452–457. <https://doi.org/10.1016/j.amepre.2009.02.002>.
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101. <https://doi.org/10.1191/1478088706qp063oa>.
- Cappadocia, M., & Weiss, J. A. (2011). Review of social skills training groups for youth with Asperger syndrome and high functioning autism. *Research in Autism Spectrum Disorders*, 5(1), 70–78.
- Chen, Y. W., Bundy, A., Cordier, R., & Einfeld, S. (2014). Feasibility and usability of experience sampling methodology for capturing everyday experiences of individuals with autism spectrum disorders. *Disability and Health Journal*, 7(3), 361–366. <https://doi.org/10.1016/j.dhjo.2014.04.004>.
- Choque Olsson, N., Flygare, O., Coco, C., Gorling, A., Rade, A., Chen, Q., ... Bölte, S. (2017). Social skills training for children and adolescents with autism spectrum disorder: A randomized controlled trial. *Journal of the American Academy of Child & Adolescent Psychiatry*, 56(7), 585–592. <https://doi.org/10.1016/j.jaac.2017.05.001>
- Choque Olsson, N., Karlsson, A., Andersson, S., Boström, A., Ljungström M., & Bölte, S. (2016). Cross-cultural adaptation of the KONTAKT social skills group training program for children and adolescents with high-functioning Autism spectrum disorder: A feasibility study. *Scandinavian Journal of Child and Adolescent Psychiatry and Psychology*, 4(2), 46–54. <https://doi.org/10.21307/sjcapp-2016-009>.
- Choque Olsson, N., Rautio, D., Asztalos, J., Stoetzer, U., & Bölte, S. (2016). Social skills group training in high-functioning autism: A qualitative responder study. *Autism*, 20(8), 995–1010. <https://doi.org/10.1177/1362361315621885>.
- Constantino, J. N., & Gruber, C. P. (2005). *Social responsiveness Scale (SRS)*. Los Angeles, CA: Western Psychological Services.
- Corbett, B. A., Blain, S. D., Lounnou, S., & Baiser, M. (2017). Changes in anxiety following a randomized control trial of a theatre-based intervention for youth with autism spectrum disorder. *Autism*, 21(3), 333–343. <https://doi.org/10.1177/1362361316643623>.
- Corbett, B. A., Key, A. P., Qualls, L., Fecteau, S., Newsom, C., Coke, C., et al. (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. <https://doi.org/10.1002/aur.1341>.
- Cordier, R., Brown, N., Chen, Y., Wilkes-Gillan, S., & Falkmer, T. (2014). Piloting the use of experience sampling method to investigate the everyday social experience of children with Asperger syndrome/high functioning autism. *Developmental Neurorehabilitation*, 19(2), 103–110. <https://doi.org/10.3109/17518423.2014.915244>.
- Gabriels, R., Pan, Zh, Dechant, B., Angnew, J. A., Brim, N., & Mesibov, G. (2015). Randomized controlled trial of therapeutic horseback riding in children and adolescents with autism spectrum disorder. *Journal of the American Academy of Child and Adolescent Psychiatry*, 54, 541–549. <https://doi.org/10.1016/j.jaac.2015.04.007>.
- Gay, L. R., Mills, G. E., & Airasian, P. (2006). *Educational research: Competencies for analysis and applications and applications* (8th ed.). Upper Saddle River, NJ: Pearson Education.
- Grynszpan, O., Nadel, J., Martin, J. C., Simonin, J., Bailleul, P., Wang, Y., ... Constant, J. (2012). Self-monitoring of gaze in high functioning autism. *Journal of Autism and Developmental Disorders*, 42(8), 1642–1650, 2000–2000. <https://doi.org/10.1007/s10803-011-1404-9>.
- Guastella, A. J., Einfeld, S. L., Gray, K. M., Rinehart, N. J., Tonge, B. J., Lambert, T. J., et al. (2010). Intranasal oxytocin improves emotion recognition for youth with autism spectrum disorders. *Biological Psychiatry*, 67(7), 692–694. <https://doi.org/10.1016/j.biopsych.2009.09.020>.
- Henninger, N. A., & Taylor J. L. (2013). Outcomes in adults with autism spectrum disorders: A historical perspective. *Autism: The International Journal of Research and Practice*, 17(1), 103–116. <https://doi.org/10.1177/1362361312441266>.
- Herbrecht, E., Bölte, S., & Poustka, F. (2008). *KONTAKT - Frankfurter Kommunikations- und soziales Interaktions-Gruppen-training bei Autismus-Spektrum-Störungen*. Göttingen: Hogrefe Psychologiforlaget AB.
- Herbrecht, E., Bölte, S., & Poustka, F. (2011). *KONTAKT: social färdighetsträning i grupp med fokus på kommunikation och social interaktion vid autismspektrumtillstånd enligt Frankfurtmodellen*. Stockholm: Hogrefe Psychologiforlaget AB.
- Herbrecht, E., & Poustka, F. (2007). Frankfurt group social communication and interaction skills training for children and adolescents with autism spectrum disorders. *Zeitschrift für Kinder- und Jugendpsychiatrie und Psychotherapie*, 35(1), 33–40.
- Horsfield, B., & Zusters, L. (2010). *The Australian SAS: The untold story [video]*. Queensland, Australia: University of Southern Queensland.
- Houghton, S., Hattie, J., Carroll, A., Wood, L., & Baffour, B. (2016). It hurts to be lonely! Loneliness and positive mental wellbeing in Australian rural and urban adolescents. *Journal of Psychologists and Counsellors in Schools*, 26(1), 52–67. <https://doi.org/10.1017/jgc.2016.1>.
- IBM Corp. (2016). *IBM SPSS statistics for windows, version 24.0*. Armonk, NY: IBM Corp.
- Jones, D. (1988). Serious laughter: On defining Australian humour. *The Journal of Commonwealth Literature*, 23(1), 76–90. <https://doi.org/10.1177/002198948802300108>.
- Jonsson, U., Alaie, I., Löfgren-Wilteus, A., Zander, E., Marschik, P. B., Coghill, D., et al. (2017). Annual Research Review: Quality of life and childhood mental and behavioural disorders—a critical review of the research. *Journal of Child Psychology and Psychiatry*, 58(4), 439–469. <https://doi.org/10.1111/jcpp.12645>.
- Jonsson, U., Choque Olsson, N., Coco, C., Gorling, A., Flygare, O., Chen, Q., ... Bölte, S. (2019). Long-term social skills group training for children and adolescents with autism spectrum disorder: a randomized controlled trial. *European Child & Adolescent Psychiatry*, 28(2), 189–201. <https://doi.org/10.1007/s00787-018-1161-9>.

- Junek, W. (2007). Mind reading: The interactive guide to emotions. *Journal of the Canadian Academy of Child and Adolescent Psychiatry, 16*(4), 182–183.
- Kiresuk, T. J., & Sherman, R. E. (1968). Goal attainment scaling: A general method for evaluating comprehensive community mental health programs. *Community Mental Health Journal, 4*(6), 443–453.
- Kiresuk, T. J., Smith, A., & Cardillo, J. E. (1994). *Goal attainment scaling: Applications, theory, and measurement*. Hillsdale, NJ: Lawrence Erlbaum Associates.
- Kreuter, M., Siösteen, A., Erkhölm, B., Bystörm, U., & Brown, D. J. (2005). Health and quality of life of persons with spinal cord lesion in Australia and Sweden. *Spinal Cord, 43*(2), 123. <https://doi.org/10.1038/sj.sc.3101692>.
- Kumpfer, K., Alvarado, R., Smith, P., & Bellamy, N. (2002). Cultural sensitivity and adaptation in family-based prevention interventions. *Prevention Science, 3*(3), 241–246. <https://doi.org/10.1023/A:1019902902119>.
- Lau, A. S. (2006). Making the case for selective and directed cultural adaptations of evidence-based treatments: Examples from parent training. *Clinical Psychology: Science and Practice, 13*(4), 295–310. <https://doi.org/10.1111/j.1468-2850.2006.00042.x>.
- Laugeson, E. A., Frankel, F., Mogil, C., & Dillon, A. R. (2009). Parent-assisted social skills training to improve friendships in teens with autism spectrum disorders. *Journal of Autism & Developmental Disorders, 39*(4), 596–606. <https://doi.org/10.1007/s10803-008-0664-5>.
- Lerner, M., & Mikami, A. (2012). A preliminary randomized controlled trial of two social skills interventions for youth with high-functioning autism spectrum disorders. *Focus on Autism and Other Developmental Disabilities, 27*, 147–157. <https://doi.org/10.1177/1088357612450613>.
- Locke, K. D. (2014). Circumplex scales of intergroup goals: An interpersonal circle model of goals for interactions between groups. *Personality and Social Psychology Bulletin, 40*(4), 433–449. <https://doi.org/10.1177/0146167213514280>.
- Locke, K. D., & Mitchell, G. E. (2016). Self-perceptions, parent-perceptions, and meta-perceptions of the interpersonal efficacy of adolescents with autism spectrum disorder. *Research in Autism Spectrum Disorders, 31*, 19–29. <https://doi.org/10.1016/j.rasd.2016.07.006>.
- Locke, K. D., & Sadler, P. (2007). Self-efficacy, values, and complementarity in dyadic interactions: Integrating interpersonal and social-cognitive theory. *Personality and Social Psychology Bulletin, 33*(1), 94–109. <https://doi.org/10.1177/0146167206293375>.
- Lord, C., Rutter, M., Dilavore, P. C., Risi, K., Gotham, K., & Bishop, S. L. (2012). *Autism Diagnostic Observation Schedule, Second Edition (ADOS-2) (Part 1): Modules 1–4 [Manual]*. Torrance, CA: Western Psychological Services.
- Louwerse, A., Van Der Geest, J. N., Tulen, J. H. M., Van Der Ende, J., Van Gool, A. R., Verhulst, F. C., et al. (2013). Effects of eye gaze directions of facial images on looking behaviour and autonomic responses in adolescents with autism spectrum disorders. *Research in Autism Spectrum Disorders, 7*(9), 1043–1053. <https://doi.org/10.1016/j.rasd.2013.04.013>.
- Marsiglia, F. F., & Booth, J. M. (2015). Cultural adaptation of interventions in real practice settings. *Research on Social Work Practice, 25*(4), 423–432. <https://doi.org/10.1177/1049731514535989>.
- Matthews, N. L., Orr, B. C., Warriner, K., Decarlo, M., Sorensen, M., Laffin, J., et al. (2018). Exploring the effectiveness of a peer-mediated model of the PEERS curriculum: A pilot randomized control trial. *Journal of Autism & Developmental Disorders, 48*(7), 2458–2475. <https://doi.org/10.1007/s10803-018-3504-2>.
- Mattick, R. P., & Clarke, J. C. (1998). Development and validation of measures of social phobia scrutiny fear and social interaction anxiety. *Behaviour Research and Intervention, 36*(4), 455–470. [https://doi.org/10.1016/S0005-7967\(97\)10031-6](https://doi.org/10.1016/S0005-7967(97)10031-6).
- McGregor, C. (1980). *The Australian people/Craig McGregor*. Sydney: Hodder and Stoughton.
- McStay, R. L., Dissanayake, C., Scheeren, A., Koot, H. M., & Beeger, S. (2014). Parenting stress and autism: The role of age, autism severity, quality of life and problem behaviour of children and adolescents with autism. *Autism, 18*(5), 502–510. <https://doi.org/10.1177/1362361313485163>.
- Offord, B. A., Kerruish, E., Garbutt, R., Wessell, A., Pavlovic, K., Nandy, A., & Lal, V. (2014). *Inside Australian culture: Legacies of enlightenment values*. Retrieved from <https://ebookcentral.proquest.com/lib/curtin/detail.action?docID=1753229>.
- Pandolfi, V., Magyar, C. I., & Norris, M. (2014). Validity study of the CBCL 6–18 for the assessment of emotional problems in youth with ASD. *Journal of Mental Health Research in Intellectual Disabilities, 7*(4), 306–322. <https://doi.org/10.1080/19315864.2014.930547>.
- QSR International. (2018). *NVivo qualitative data analysis software-version 12*. Los Angeles: QSR International Pty Ltd.
- Rabin, S. J., Israel-Yaacov, S., Laugeson, E. A., Mor-Snir, I., & Golan, O. (2018). A randomized controlled trial evaluating the Hebrew adaptation of the PEERS® intervention: Behavioral and questionnaire-based outcomes. *Autism Research, 11*(8), 1187–1200. <https://doi.org/10.1002/aur.1974>.
- Radley, K. C., Ford, B. W., McHugh, M. B., Dadakhodjaeva, K., O’Handley, R. D., Battaglia, A. A., et al. (2015). Brief report: Use of superheroes social skills to promote accurate social skill use in children with Autism spectrum disorder. *Journal of Autism and Developmental Disorders, 45*(9), 3048–3054. <https://doi.org/10.1007/s10803-015-2442-5>.
- Ravindran, N., & Myers, B. J. (2012). Cultural influences on perceptions of health, illness, and disability: A review and focus on Autism. *Journal of Child and Family Studies, 21*(2), 311–319. <https://doi.org/10.1007/s10826-011-9477-9>.
- Roekel, E., Goossens, L., Verhagen, M., Wouters, S., Engels, R. C. M. E., & Scholte, T. H. J. (2014). Loneliness, affect, and adolescents’ appraisals of company: An experience sampling method study. *Journal of Research on Adolescence, 24*(2), 350–363. <https://doi.org/10.1111/jora.12061>.
- Rozental, A., Kottorp, A., Boettcher, J., Andersson, G., & Calbring, P. (2016). Negative effects of psychological treatments: An exploratory factor analysis of the negative effects questionnaire for monitoring and reporting adverse and unwanted events. *PLoS ONE, 11*(6), e0157503. <https://doi.org/10.1371/journal.pone.0157503>.
- Ruble, L. A., Dalrymple, N. J., & McGrew, J. H. (2012). *Collaborative model for promoting competence and success for students with ASD*. New York: Springer.
- Schohl, K. A., Hecke, A. V., Carson, A. M., Dolan, B., Karst, J., & Stevens, S. (2014). A replication and extension of the PEERS intervention: Examining effects on social skills and social anxiety in adolescents with Autism spectrum disorders. *Journal of Autism and Developmental Disorders, 44*(3), 532–545. <https://doi.org/10.1007/s10803-013-1900-1>.
- Sheldrick, R., Neger, E., Shipman, D., & Perrin, E. (2012). Quality of life of adolescents with autism spectrum disorders: Concordance among adolescents’ self-reports, parents’ reports, and parents’ proxy reports. *Quality of Life Research, 21*(1), 53–57. <https://doi.org/10.1007/s11136-011-9916-5>.
- Shields, N., Van den Bos, R., Buhler-Smith, K., Prendergast, L., & Taylor, N. (2019). A community-based exercise program to increase participation in physical activities among youth with disability: A feasibility study. *Disability and Rehabilitation, 41*(10), 1152–1159. <https://doi.org/10.1080/09638288.2017.1422034>.
- Signorini, P. R., Wiesemes, R., & Murphy, R. (2009). Developing alternative frameworks for exploring intercultural learning: A critique

- of Hofstede's cultural difference model. *Teaching in Higher Education*, 14(3), 253–264. <https://doi.org/10.1080/13562510902898825>.
- SMI SensoMotoric Instruments. (2015). SMI gaze and eye tracking systems. Retrieved from <https://www.smivision.com/>.
- Steinberg, L. (2001). Adolescent development. *Annual Review of Psychology*, 52, 83–110.
- Tammimies, K., Li, D., Rabkina, L., Stamouli, S., Nicolaou, V., Berggren, S., ... Bölte, S. (2019). Association between copy number variation and response to social skills training in autism spectrum disorder. *Scientific reports*, 9(1), 9810. <https://doi.org/10.1038/s41598-019-46396-1>.
- Taylor, J. L., Dove, D., Veenstra-VanderWeele, K., Sathe, N. A., McPheeters, M. L., Jerome, R. N., et al. (2012). *Interventions for adolescents and young adults with autism spectrum disorders*. Rockville: Agency for Healthcare Research and Quality.
- Thomas, S., Sciberras, E., Lycett, K., Papadopoulos, N., & Rinehart, N. (2018). Physical functioning, emotional, and behavioral problems in children with ADHD and comorbid ASD: A cross-sectional study. *Journal of Attention Disorders*, 22(10), 1002–1007. <https://doi.org/10.1177/1087054715587096>.
- Varni, J. W., Seid, M., & Rode, C. A. (1999). The PedsQL: Measurement model for the pediatric quality of life inventory. *Medical Care*, 37(2), 126.
- Vernon, T. W., Miller, A. R., Ko, J. A., Barrett, A. C., & McGarry, E. S. (2018). A randomized controlled trial of the Social Tools And Rules for Teens (START) program: An immersive socialization intervention for adolescents with Autism spectrum disorder. *Journal of Autism & Developmental Disorders*, 48(3), 892–904. <https://doi.org/10.1007/s10803-017-3380-1>.
- Villagran, M., Hajeck, Ch, Zhao, X., Peterson, E., & Wittenberg-Lyles, E. (2012). Communication and culture: Predictors of treatment adherence among Mexican immigrant patients. *Journal of Health Psychology*, 17(3), 443–452. <https://doi.org/10.1177/1359105311417194>.
- Wechsler, D. (2011). *Wechsler Abbreviated Scale of Intelligence, Second Edition (WASI-II)*. San Antonio, TX: NCS Pearson. <https://doi.org/10.1177/0734282912467756>
- White, S., & Roberson-Nay, R. (2009). Anxiety, social deficits, and loneliness in youth with autism spectrum disorders. *Journal of Autism and Developmental Disorders*, 39(7), 1006–1013. <https://doi.org/10.1007/s10803-009-0713-8>.
- White, S. W., Ollendick, T., Albano, A.M., Oswald, D., Johnson, C., Southam-Gerow, M., ... Scahill, L. (2013). Randomized controlled trial: Multimodal Anxiety and Social Skill Intervention for adolescents with autism spectrum disorder. *Journal of Autism & Developmental Disorders*, 43(2), 382–394. <https://doi.org/10.1007/s10803-012-1577-x>.
- World Health Organization. (2001). *International classification of functioning, disability, and health: ICF*. Geneva: World Health Organization.
- Yoo, H.J., Geonho, B., Cho, I. H., Kim, E. K., Kim, J. H., Min, J. W., ... Laugeson, E. A. (2014). A randomized controlled trial of the Korean version of the PEERS parent-assisted social skills training program for teens with ASD. *Autism Research*, 7(1), 145–161. <https://doi.org/10.1002/aur.1354>.
- Zirkel, S., Garcia, J. A., & Murphy, M. C. (2015). Experience-sampling research methods and their potential for education research. *Educational Researcher*, 44(1), 7–16. <https://doi.org/10.3102/0013189X14566879>.

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