

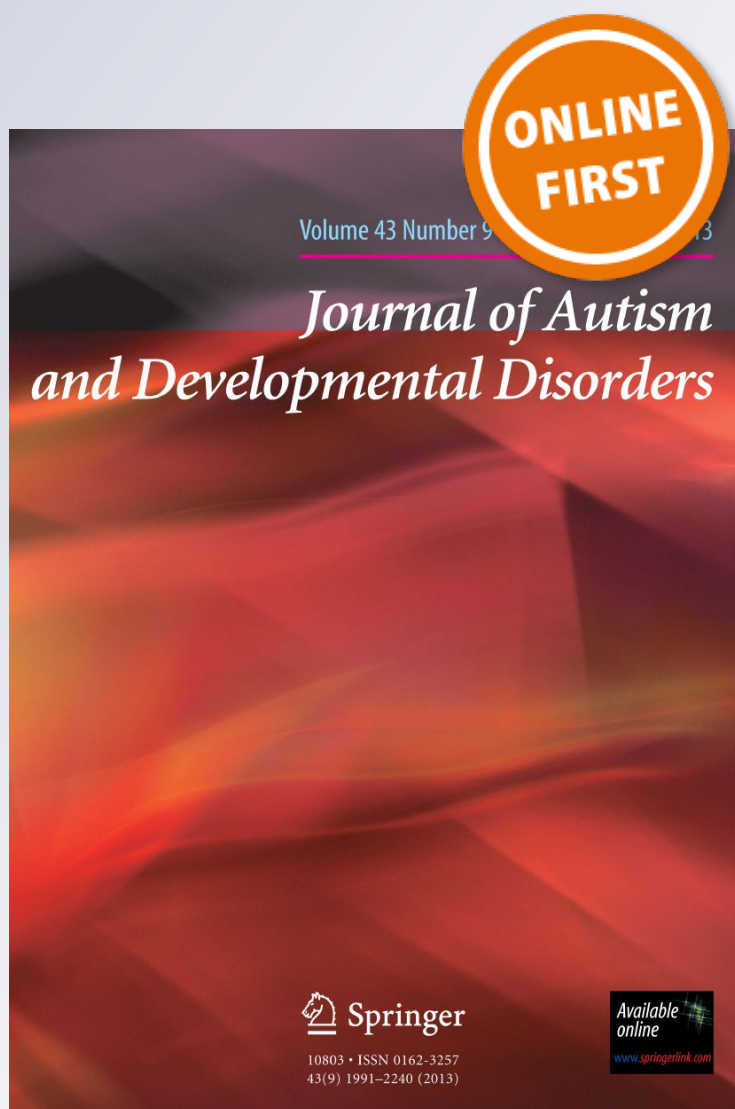
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Validating a Culturally-sensitive Social Competence Training Programme for Adolescents with ASD in a Chinese Context: An Initial Investigation

Raymond Won Shing Chan¹ · Cecilia Nga Wing Leung¹ · Denise Ching Yiu Ng¹ · Sania Sau Wai Yau¹

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Abstract Previous studies on social skills training on ASD were done almost exclusively in the West with children as the main subjects. Demonstrations of the applicability of social interventions in different cultures and age groups are warranted. The current study outlined the development and preliminary evaluation of a CBT-context-based social competence training for ASD (CBT-CSCA) developed in Hong Kong for Chinese adolescents with ASD. Twenty-five adolescents (aged 12–17 years, with a FSIQ above 80) were recruited. Significant improvements in social competence, autistic symptoms and general psychopathology at post-training and 3-month follow-up were reported by the parents. The study provided initial evidence support to the applicability of social competence training for adolescents with ASD in a different culture.

Keywords Autistic spectrum disorder (ASD) · Social competence · Adolescent · CBT · Chinese

Introduction

Impaired social functioning is a hallmark feature of autism spectrum disorder (ASD). It differentiates individuals with ASD from those with other developmental disorders (Klin et al. 2007) and becomes a defining feature in the current diagnostic approaches (American Psychiatric Association 2013; World Health Organization 1992). Despite

improvements shown in other features of ASD upon interventions (Hanley et al. 2001; Lovaas 1987), social difficulties persist as individuals enter adolescence and young adulthood (Schall and McDonough 2010). This persistence is possibly due to a rapid change in social landscape and the increase in complexity of social interaction during adolescence.

In lack of the necessary social skills to handle complex social situations, adolescents with ASD tend to suffer from a number of negative consequences, including restricted social circle, peer rejection and bullying (Rieffe et al. 2010; Shattuck et al. 2011). Without pleasant social experiences to buffer against stress (Miller and Ingham 1976), adolescents with ASD also suffer from a high prevalence of psychiatric disorders (Simonoff et al. 2008). Presumably, equipping adolescents with ASD with appropriate social skills improve their social deficits as well as their co-morbid psychiatric symptoms. Addressing the critical socialisation needs of adolescents with ASD, there has been a rapid increase in research on social competence interventions for adolescents with ASD since the previous decade (Reichow et al. 2013). Group-based intervention has demonstrated initial success (Miller et al. 2014), such as the Programme for the Education and Enrichment of Relational Skills (PEERS) (Laugeson et al. 2012), the Multimodal Anxiety and Social Skills Intervention (MASSI) program (White et al. 2013), Skillstreaming (Lopata et al. 2008). However, most studies published are designed and validated in the Western culture, such as the USA, Germany and Scotland, limiting their generalisability. The only study in the East is a validation study of the PEERS in Korea (Yoo et al. 2014).

Cultural factors have been suggested to influence treatment with ASD, including beliefs about the causes of ASD, treatment selection, available resources, family support, professional relationship and expectation of service users

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(Daley 2002; Ravindran and Myers 2012). Moreover, ASD is known to profoundly impact on one's communication and reciprocal social interaction (APA 2013). Thus any intervention, if effective, would have to address the individual's cultural, social and language needs and this is in line with the ongoing movement toward evidence-based practice which has called for a consideration of culture and context in competent psychological practice, including targeted interventions (APA 2006). On the other hand, carrying out cultural adaptations in treatment outcome studies also present unique opportunities to find out how psychological interventions work (Bernal et al. 2009).

In light of the distinctiveness of Chinese culture as compared to the West, the CBT-Context-Based Social Competence Training for ASD (CBT-CSCA) was developed locally to cater the unique cultural and service needs for Chinese adolescents with ASD. The procedures for preparing the training programme were similar to those described in the cultural adaptation model (Domenech Rodríguez and Weiling 2004), the highlights of which include balancing community and scientific needs; adapting appropriate evaluation measures and developing a culturally sensitive packaged intervention. The development of CBT-CSCA mostly followed these phases and was guided by scientific, community and professional inputs. These consisted of regular consultation and advice from youths with ASD and their parents as well as a panel of experts in ASD which included clinical psychologist, child psychiatrist, social worker and counsellor. Regarding the development of the CBT-CSCA training strategies and contents, the steps were as follows:

1. *Consolidating Theoretical Basis* A systematic search and review of existing literature and treatment protocols were conducted to examine the conceptual framework, programme designs and effectiveness of existing programmes delivered to individuals with ASD. Social competence refers to "an organisational construct that reflects the child/adolescent's capacity to integrate behavioural, cognitive and affective skills to adapt flexibly to diverse social contexts and demands" (Bierman and Welsh 2000). Traditionally, social skills training adopted a behavioural approach, which could probably be due to the historical legacy of the development of the treatment which originated in the population of young children. In adolescence, with the growing cognitive abilities and emotional challenges, the inclusion of cognition and emotion in the social competence training is considered to be indispensable. For adolescents with ASD, the theoretical basis of including cognition in social competence training comes from the identified delay in the development of the theory of mind (Baron-Cohen 1989). More recently, Yager and Iarocci (2013) in their development of multidimensional social competence scale (MSCS) for adolescents with ASD, confirmed a proposed social competence model with social inferencing and emotion regulation as two core factors.
2. *Developing Culturally-Sensitive Training Content* The preparation of the training material followed the model suggested by Yager and Iarocci (2013). The seven domains of social competence were organised into four modules of training, specifically social context (social motivation and social knowledge), behaviour (verbal conversational and nonverbal sending skills), emotion (emotion regulation skills and demonstrating empathic concern) and cognition (social inferencing). In each module, specific and concretised behavioural and cognitive skills are listed as targets of training. To incorporate cultural-sensitive elements in training content, everyday social contexts unique to local youth were first identified and subsequently used as a basis for training. These social contexts included dining out with family relatives, visiting extended family members, group project discussion in school and visiting arcade with peers. Besides, training activities and games were designed relating to the local popular culture. For instance, an ordinary local game that the winner of rock-paper-scissors would become an 'emperor' was modified to require players to demonstrate active listening skills in becoming the winner. Common local board games were also prepared during the naturalistic game time in each session.
3. *Designing Training Method* Existing social skills training programmes for adolescents were mostly grounded on behavioural principles (Miller et al. 2014). Some training programmes developed from behavioural approach started to respond to this service need by including elements of cognition (Laugeson et al. 2012) while some programmes were adopting cognitive-behavioural principles (White et al. 2013) or based solely on cognitive elements (Ozonoff and Miller 1995). Training programmes on emotion and cognition as an integral part of social competence training for ASD are limited.
4. *Manualising The Training* The training programme was manualized and trial-run to test its feasibility. Two pilot groups were conducted, and their data were not included in the present study. The feedback on the training con-

tent and structure was examined and found to be mostly positive. The participants suggested adding in more “fun” time. As a result, in the finalised manual, more practice activities and an extension of the naturalistic game time was included. However, the framework and didactic content remained virtually unchanged compared to the previously drafted manual.

5. *Validating With Local Assessment Tools* The Multidimensional Social Competence Scale (MSCS) (Yager and Iarocci 2013) was employed as the primary measure in consideration of its theoretical origin with the CBT-CSCA and sensitivity in assessing social competence. The MSCS was translated into Chinese and validated locally (Leung 2014). Secondary measures of the study included Autism Spectrum Quotient-10 items-Chinese version (AQ-10-C), the Child Behaviour Checklist-Chinese version (CBCL-C), Youth Self-Report-Chinese version (YSR-C), and Parental Stress Scale-Chinese version (PSS-C), all with existing local norms.

Study Aim

The current study sought to outline the development and preliminary evaluation of CBT-CSCA. It was hypothesised that the training would significantly improve social competence and related psychological functioning upon the completion of the training and the improvements would be maintained at 3-month follow-up. The dependent variables under study were: social competence, autistic symptoms, general psychopathology and parental stress.

Methods

Participants

The inclusion criteria of the study were: (a) between 12 and 17 years of age, (b) with a confirmed diagnosis of an Autistic disorder, PDD-NOS or Asperger's Syndrome, (c) with a FSIQ above 80, (d) not present with active suicidal ideation or psychotic symptoms. The participants were recruited via referrals by local child psychiatric centres, child assessment services and schools. All participants had a confirmed diagnosis of ASD made by a registered psychiatrist or clinical psychologist before enrolling from the Jockey Club iREACH Social Competence Development Center, New Life Psychiatric Rehabilitation Association. The full-scale intelligence quotient (FSIQ) of all participants was equal to or above 80, falling from low average to the superior range, as assessed by standardised intelligence tests, the Hong Kong-Wechsler Intelligence Scale for Children (HK-WISC) or the Wechsler intelligence scale for children-fourth edition (WISC-IV).

Thirty-one adolescents on wait-list with inclusion criteria fulfilled were contacted for screening. Four declined to join due to time clash and low motivation. Twenty-seven adolescents were recruited. All of the teenagers and parents were ethnic Chinese who were native speakers of Cantonese, a local dialect of Southern China.

During the 15 weeks of training, two of them withdrew due to lack of motivation to continue. Their data was not included in the study due to uncompleted training. Twenty-five adolescents ranging from 12 to 17 years of age ($M = 14.7$, $SD = 1.85$) completed the training. There were 20 males and 5 females. Three of them did not return the questionnaires at 3-month follow-up. Participant flow of the study was illustrated in Fig. 1. Table 1 summarized all participants' ASD diagnosis ($n = 25$) and nine of them ($n = 9$) also had a co-morbid psychiatric illness. Four participants ($n = 4$) with co-morbid attention-deficit/hyperactivity disorder (ADHD), attention deficit disorder (ADD), or tic disorder were on medication throughout the whole training.

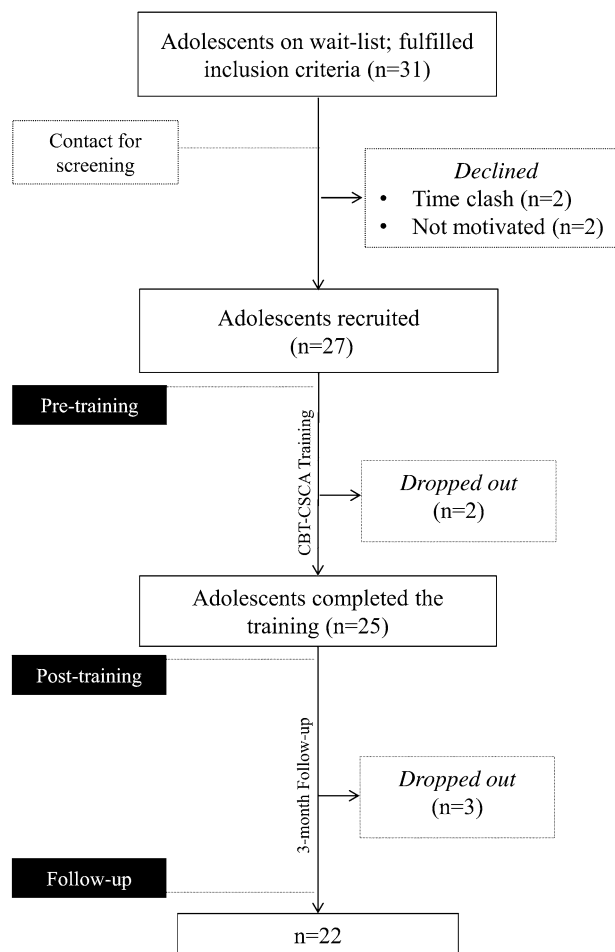


Fig. 1 Participant flow of the study

Table 1 Demographics of participants

Age	Mean = 14.7 (1.85)
Gender	
Male	n = 20
Female	n = 5
Diagnosis	
Autistic disorder	n = 18
Asperger's syndrome	n = 5
PDDNOS	n = 2
Co-morbidity	
ADHD/ADD	n = 4
Tic disorder	n = 2
Specific learning difficulty	n = 1
Language disorder	n = 1
Social anxiety disorder	n = 1

Participants with other co-morbidity were not on any behavioural modification drug.

Measures

Primary Measure

Multidimensional Social Competence Scale-Chinese Version (MSCS-C) The MSCS is a 77-item questionnaire assessing social competence from a multidimensional perspective in high-functioning individuals with ASD, completed by primary caregivers (Yager and Iarocci 2013). The questionnaire adopts a Likert rating scale from 1 to 5, with a higher score indicating better social competence. In addition to the total score, the questionnaire also generates seven domain measures, which were social motivation (SM), social inferencing (SI), demonstrating empathic concern (DEC), social knowledge (SK), verbal conversation skills (VCS), nonverbal sending skills (NSS) and emotional regulation (ER). The MSCS-C was validated by Leung (2014). It yields a 7-dimensional factor solution that correlates with the original version ($r > .9$). It also demonstrates excellent internal consistency (Cronbach's $\alpha = 0.85-.97$), discriminant validity (AUC = 0.78-.90), and test-retest reliability ($r = .77-.90$). In the current study, the average scores of items (ranging from 1 to 5) in each domain were used as the outcome variables.

Secondary Measures

Autism Spectrum Quotient-10 items-Chinese version (AQ-10-C) The Autism spectrum quotient (AQ) is a questionnaire designed for assessing autism spectrum conditions (Baron-Cohen et al. 2001). The AQ demonstrates good excellent internal consistency (Cronbach's $\alpha = .65-.77$)

and test-retest reliability ($r = .7$). By drawing two questions, each of five domains of AQ, the condensed version, AQ-10 was found to have similar predictive power as the full version and was recommended as a screening tool (Allison et al. 2012). The Chinese version of AQ was evaluated by Wong (2010). The AQ-10-C was also standardised in Hong Kong, with comparable predictive validity to Chinese full-form AQ demonstrated (Leung 2015). The current study adopted a 4-point Likert scale with a lower score indicating less autistic symptoms. The average rating (ranging from 1 to 4) of all items in the questionnaire was used as the outcome variable.

Child Behavior Checklist-Chinese Version (CBCL-C)

The Child Behavior Checklist (CBCL) is a widely-used caregiver report form identifying general psychopathology in children age 6-18. The CBCL consists of 113 questions on children's problematic behaviours, each rated on a 3-point scale, yielding a total score and ten subscale scores, which were withdrawn (WIT), somatic complaints (SOM), anxious/depressed (ANX), social problems (SOC), thought problems (THO), attention problems (ATT), delinquent behavior (DEL), aggressive behavior (AGG), internalizing behavior (INT) and externalizing behavior (EXT). A higher score on CBCL indicates a more severe problem. The CBCL-C, validated by Leung et al. (2006), demonstrates good criterion validity (AUC = .73-.96) and test-retest reliability (ICC = 0.76-0.83).

Youth Self-Report-Chinese Version (YSR-C)

The YSR is a self-report measure that assesses general psychopathology for adolescents aged 11-18. As a parallel form of CBCL, the YSR consists of 112 questions on adolescent's problematic behaviours, with a similar design, scoring and variables generated. The YSR-C was validated by Leung et al. (2006), demonstrates good criterion validity (AUC = .64-.75) and test-retest reliability (ICC = .66-.86).

Parental Stress Scale-Chinese Version (PSS-C)

The PSS is an 18-item scale developed by Berry and Jones (1995) on measuring parental stress, with good reliability (Cronbach's $\alpha = .83$) demonstrated. The Chinese version of PSS is validated by Cheung (2000). It consists of 17 items, each rated on a Likert scale from 1 to 6, generating a total score ranging from 17 to 102, with a higher score indicating a greater level of parental stress. The Chinese version demonstrates good reliability (Cronbach's $\alpha = .89$). In the current study, the average score of all items in the questionnaire was used as the outcome variable.

Procedures

Study Approval

The study had been reviewed and received ethical approval regarding the Declaration of Helsinki (2013) from the hosting organisation, New Life Psychiatric Rehabilitation Association. Informed consent to the study was obtained from the participants and their parents.

Treatment Setting and Intervention

The CBT-CSCA was conducted in a community-based centre serving adolescents with ASD in Hong Kong. The service team, which included clinical psychologists, social workers, counsellors, and peer support workers, aims to provide social competence training and individual counselling for adolescents with ASD to support their needs across various developmental stages, and to facilitate their integration into the community.

For the current study, a total of four groups, each had 5–7 members, were arranged. The social competence training consisted of four major modules and 15 weekly sessions (see Table 2). Each session lasted for 120 min and followed a standardised format modelling a CBT session. Typically, homework was reviewed at the beginning of each meeting, with compliance and quality recorded. It was followed by didactic teaching and role-play demonstrations on the targeted skills of each session. Newly-learned skills were rehearsed by adolescents, during which they received performance feedback. The teaching was followed by a naturalistic game and snack times, during which the use of learned skills from the trainees was systematically reinforced. Before the session ended, a test on teaching materials was distributed to consolidate learning. Homework for the coming week was assigned to encourage skills generalisation to natural settings. The parents were invited to join a concurrent parents' session on alternate weeks. The parents' meeting was intended to review taught skills, follow-up on homework given and go over practices with parents.

The training programme was conducted by trained workers, who were registered clinical psychologists, counsellors or social workers, all with a graduate or post-graduate qualifications and substantial experience in conducting social competence training with adolescents with ASD. Workers were fully trained in the CBT-CSCA with confirmed competence. The implementation fidelity of the training was ensured through regular on-site checking regarding the established manual and bi-weekly supervision by the first author (RC).

Results

Repeated-measure ANOVA was conducted to assess training effect across three time-points, pre-training (T1), post-training (T2), and 3-month follow-up (T3) in both parents and adolescent measures. Follow-up analyses of from T1 to T2 and from T1 to T3 were conducted using paired sample *t*-tests. Results of parent's measures and adolescent measures were summarized in Tables 3 and 4 respectively. Graphical representations of results across three time-points were illustrated in Fig. 2.

Primary Measures

Multidimensional Social Competence Scale-Chinese Version (MSCS-C)

For parents' report in MSCS-C, repeated-measure ANOVA identified significant difference across three time-points in social motivation [$F(2, 34) = 3.54, p = .04$], social inferencing [$F(2, 34) = 9.87, p < .001$], verbal conversation skills [$F(2, 34) = 8.45, p = .001$], emotional regulation [$F(2, 34) = 11.54, p < .001$] and total score [$F(2, 34) = 0.84, p = .001$]. Follow-up analyses from T1 to T2 indicated significant improvement in subscales of social inferencing [$t(21) = -4.75, p < .001$], demonstrating empathic concern [$t(21) = -2.05, p = .053$], verbal conversation skills [$t(21) = -3.86, p = .001$], nonverbal sending skills [$t(21) = -2.09, p = .049$], emotion regulation [$t(21) = -4.09, p = .001$], and total score [$t(21) = -3.72, p = .001$]. comparison between T1 and T3 revealed significant improvement in MSCS-C on social motivation [$t(19) = -2.48, p = .023$], social inferencing [$t(19) = -3.39, p = .003$], social knowledge [$t(19) = -2.31, p = .032$], verbal conversation skills [$t(19) = -4.03, p = .001$], emotion regulation [$t(19) = -3.98, p = .001$] and total score [$t(19) = -3.25, p = .004$].

For adolescents' self-report on MSCS-C, comparison between T1 and T2 identified significant improvement in social motivation [$t(22) = -2.58, p = .017$], social inferencing [$t(22) = -2.85, p = .009$], verbal conversational skills [$t(22) = -3.44, p = .002$] and total scores [$t(22) = -2.83, p = .010$]. However, repeated-measure ANOVA of MSCS-C total score did not identify statistically significant changes [$F(2, 34) = 2.24, p = .123$]. Nevertheless, small to medium effect sizes (Partial Eta Squares from 0.02 to 0.13) were observed in all variables indicating a positive trend in overall social competence.

Secondary Measures

Autism Spectrum Quotient-10 Items-Chinese Version (AQ-10-C)

The parents' report in AQ-10-C identified significant differences across three time-points [$F(2, 34) = 6.24, p = .005$].

Table 2 Overview of the CBT-CSCA

Session	Module	Contents	Homework
1	Social context: motivation	Introduce the purpose, structure and rules of the training programme Enhance motivation in group participation	Adolescents record social encounters and the benefits of these encounters
2	Social context: knowledge	Understand hidden social rules in social contexts Learn how to detect hidden social rules in social contexts common to adolescents Introduce perspective-taking questions	Adolescents detect hidden social rules in contexts common to them and evaluate their performance in following them
3	Social context: knowledge	Understand general social rules across different social contexts Learn how to detect general social rules	Adolescents apply skills in detecting general social rules in different settings
4	Behaviour: active listening	Learn active listening skills Detect signals of exiting conversations and practice their application	Adolescents apply active listening skills and signals of exiting conversations
5	Behaviour: conversation	Learn how to end and maintain conversations Understand four conversation blockers	Adolescents practice skills in ending and maintaining conversations
6	Behaviour: conversation	Learn how to initiate and maintain conversations Practice skills in initiate, maintain and end conversations in different social contexts	Adolescents practice integrated skills in initiating, maintaining and ending conversations
7	Behaviour: electronic communication	Learn how to join a group conversation Learn skills in electronic communication	Adolescents practice skills in joining a group conversation and electronic communication
8	Emotion: facial recognition & expression	Understand how to recognise emotions through facial expressions Practice expressing emotions through facial expressions	Adolescents practice recognising and expressing emotions using facial expressions with family members
9	Emotion: gestural & tonal recognition & expression	Understand how to skills emotions through tonal and gestural expressions Practice expressing emotions through tonal and gestural expressions	Adolescents record an emotional incident and retell it with the application of facial, tonal and gestural expressions
10	Emotion: regulation	Learn skills to handle criticisms and related negative emotions	Adolescents record incidents of criticisms and how they apply the skills in handling criticisms
11	Emotion: empathy	Understand what empathy is Learn how to deliver empathic responses	Adolescents record incidents that they apply the skills taught in delivering empathic responses
12	Cognition: social inference	Learn how to make inference on others' thoughts	Adolescents record incidents that they apply skills in making inference on others' thoughts
13	Integration: friendship building	Understand interpersonal circle Learn how to join group activities and detect unwelcome signals	Adolescents build a friendship with one of the members of the group by phone conversations or electronic communication
14	Integration: planning group activities	Learn how to invite others to join group activities and plan for group activities	Adolescents prepare their speech to be shared at the graduation party
15	Graduation	Share learning in the programme Celebrate for graduation	N/A

Follow-up analysis showed a significant reduction in scores from T1 to T2 [$t(21)=2.63$, $p=.016$]. Ratings in AQ-10-C also shows a significant decrease from T1 to T3, [$t(19)=3.56$, $p=.002$].

Reductions of scores were observed in adolescents' self-report in AQ-10-C; however, changes in scores

across three time-points were statistically insignificant [$F(2, 34)=2.27$, $\eta_p^2=.12$, $p=.119$]. Nonetheless, follow-up analyses comparing T1 and T2 [$t(21)=1.64$, $d=-.37$, $p=.115$], as well as T1 and T3 [$t(21)=1.81$, $d=-.45$, $p=.090$] identified small to medium effect in reduction of scores.

Table 3 Means for outcome variables of parent ratings across T1–T3

Variables	Mean (SD)			Partial Eta Sq	Cohen's d	
	T1 (n=25)	T2 (n=25)	T3 (n=22)		T1–T2	T1–T3
MSCS-C SM	2.29 (0.66)	2.46 (0.68)	2.62 (0.71)	0.17*	0.20	0.51*
MSCS-C SI	2.39 (0.38)	2.79 (0.33)	2.75 (0.42)	0.37***	1.28***	0.85**
MSCS-C DEC	2.44 (0.57)	2.66 (0.81)	2.61 (0.74)	0.11	0.33*	0.19
MSCS-C SK	3.01 (0.45)	3.14 (0.62)	3.21 (0.58)	0.10	0.30	0.46*
MSCS-C VCS	2.86 (0.43)	3.22 (0.47)	3.20 (0.44)	0.33***	0.75***	0.81*
MSCS-C NSS	2.77 (0.61)	3.04 (0.47)	2.90 (0.59)	0.14	0.43*	0.22
MSCS-C ER	2.85 (0.45)	3.15 (0.43)	3.18 (0.43)	0.40***	0.69***	0.73***
MSCS-C Total	2.66 (0.32)	2.92 (0.38)	2.92 (0.39)	0.33***	0.78***	0.76**
AQ-10-C	3.00 (0.32)	2.78 (0.44)	2.64 (0.34)	0.27**	−0.70*	−0.98**
PSS-C	3.20 (0.70)	3.01(0.73)	2.99 (0.66)	0.15	−0.28	−0.26
CBCL-C WIT	6.33 (3.88)	5.83 (5.12)	4.56 (3.87)	0.11	−0.12	−0.48
CBCL-C SOM	1.61 (2.00)	1.33 (1.33)	0.61 (0.92)	0.19*	−0.11	−0.55
CBCL-C ANX	6.67 (4.91)	6.06 (5.46)	4.67 (4.27)	0.12	−0.64	−0.43
CBCL-C SOC	6.11 (2.49)	5.06 (3.56)	4.56 (2.81)	0.11	−0.38	−0.49
CBCL-C THO	2.94 (2.29)	1.56 (1.29)	0.89 (0.96)	0.43***	−0.59**	−0.98**
CBCL-C ATT	8.28 (2.80)	7.50 (4.05)	5.89 (3.41)	0.24*	−0.34	−0.64*
CBCL-C DEL	3.17 (2.04)	2.22 (1.59)	2.06 (1.76)	0.20*	−0.44*	−0.59**
CBCL-C AGG	8.56 (4.26)	5.89 (3.63)	5.33 (3.50)	0.27**	−0.59**	−0.72*
CBCL-C INT	13.83 (8.27)	12.44 (9.04)	9.28 (7.20)	0.18*	−0.22	−0.56*
CBCL-C EXT	12.11 (5.90)	8.50 (4.84)	7.89 (5.42)	0.26**	−0.59**	−0.66***
CBCL-C Total	46.33 (18.07)	37.56 (17.40)	30.44 (15.36)	0.30**	−0.52**	−0.85**

MSCS-C: Multidimensional Social Competence Scale-Chinese version, SM: Social Motivation subscale, SI: Social Inferencing subscale, DEC: Demonstrating Empathic Concern subscale, SK: Social Knowledge subscale, VCS: Verbal Conversation Skills subscale, NSS: Nonverbal Sending Skills subscale, ER: Emotional Regulation subscale, AQ-10-C: Autism Spectrum Quotient-10 items-Chinese version, PSS-C: Parental Stress Scale-Chinese version, CBCL-C: Child Behavior Checklist-Chinese version, WIT: Withdrawn subscale, SOM: Somatic Complaints subscale, ANX: Anxious/Depressed subscale, SOC: Social Problems subscale, THO: Thought Problems subscale, ATT: Attention Problems subscale, DEL: Delinquent Behavior subscale, AGG: Aggressive Behavior subscale, INT: Internalizing Behavior subscale, EXT: Externalizing Behavior subscale

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

Child Behavior Checklist-Chinese Version (CBCL-C) & Youth Self-Report-Chinese Version (YSR-C)

In CBCL-C, significant differences were reported in somatic symptoms [$F(2, 34) = 3.91, p = .030$], thought problems [$F(2, 34) = 12.68, p = .001$], attention problems [$F(2, 34) = 5.23, p = .011$], delinquent behavior [$F(2, 34) = 4.30, p = .022$], aggressive behavior [$F(2, 34) = 6.18, p = .005$], internalizing behavior [$F(2, 34) = 3.68, p = .036$], externalizing behavior [$F(2, 34) = 5.82, p = .007$] and total score [$F(2, 34) = 7.33, p = .002$]. Follow-up analysis from T1 to T2 found significant reduction in thought problems [$t(21) = 2.87, p < .009$], delinquent behavior [$t(21) = 2.47, p = .022$], aggressive behavior [$t(21) = 2.82, p = .010$], externalizing behaviour [$t(21) = 3.07, p = .006$], and total score [$t(21) = 3.17, p = .005$]. Comparison between T1 and T3 revealed significant improvement in thought problems [$t(19) = 3.38, p = .003$], attention problems [$t(19) = 2.64,$

$p = .016$], delinquent behavior [$t(19) = 3.61, p = .002$], aggressive behavior [$t(19) = 2.98, p = .008$], internalizing behavior [$t(19) = 2.18, p = .042$], externalizing behavior [$t(19) = 3.25, p = .004$] and total score [$t(19) = 3.25, p = .005$].

For adolescents' self-report in YSR-C, repeated-measure ANOVA across three time-points did not identify statically significant results. Nevertheless, Partial Eta Squares from 0.02 to 0.12 were reported in all variables, suggesting small to medium effect sizes (Cohen 1988).

Parental Stress Scale-Chinese Version (PSS-C)

For PSS-C, differences across three time-points were marginally significant [$F(2, 34) = 2.88, p = .07$]. Follow-up analysis from T1 to T2 [$t(21) = 2.02, p = .06$] and from T1 to T3 [$t(19) = 1.97, p = .06$] also identified marginally significant changes.

Table 4 Means for outcome variables of adolescent self-ratings across T1–T3

Variables	Mean (SD)			Partial Eta Sq	Cohen's d	
	T1 (n = 25)	T2 (n = 25)	T3 (n = 22)		T1–T2	T1–T3
MSCS-C SM	2.94 (0.60)	3.16 (0.65)	3.07 (0.72)	0.11	0.36**	0.20
MSCS-C SI	3.20 (0.60)	3.40 (0.46)	3.27 (0.48)	0.13	0.35**	0.12
MSCS-C DEC	3.34 (0.53)	3.45 (0.69)	3.33 (0.69)	0.04	0.20	–0.01
MSCS-C SK	3.65 (0.70)	3.71 (0.60)	3.59 (0.50)	0.02	0.18	–0.09
MSCS-C VCS	3.16 (0.71)	3.33 (0.56)	3.19 (0.62)	0.09	0.30**	0.04
MSCS-C NSS	3.22 (0.49)	3.32 (0.56)	3.26 (0.53)	0.02	0.27	0.08
MSCS-C ER	3.29 (0.53)	3.46 (0.57)	3.42 (0.57)	0.10	0.22	0.25
MSCS-C Total	3.25 (0.39)	3.40 (0.45)	3.30 (0.44)	0.12	0.37**	0.12
AQ-10-C	2.49 (0.29)	2.35 (0.31)	2.35 (0.34)	0.12	–0.37	–0.45
YSR-C WIT	4.76 (2.88)	4.24 (2.39)	4.82 (2.67)	0.04	–0.26	0.02
YSR-C SOM	1.71 (2.11)	1.94 (2.54)	1.94 (2.51)	0.01	0.09	0.10
YSR-C ANX	7.76 (5.97)	7.29 (6.00)	5.88 (5.10)	0.12	–0.13	–0.34*
YSR-C SOC	4.65 (2.78)	4.29 (2.44)	4.24 (2.51)	0.02	–0.14	–0.16
YSR-C THO	1.71 (1.93)	1.76 (2.19)	1.12 (2.23)	0.05	–0.05	–0.28
YSR-C ATT	4.94 (3.56)	5.41 (3.04)	4.94 (3.63)	0.03	0.05	0.00
YSR-C DEL	2.76 (2.49)	2.82 (3.00)	2.53 (1.62)	0.01	–0.05	–0.11
YSR-C AGG	7.53 (5.08)	8.06 (4.78)	8.18 (5.39)	0.02	0.02	0.12
YSR-C INT	13.41 (8.79)	13.12 (8.62)	11.94 (8.47)	0.03	–0.10	–0.17
YSR-C EXT	9.82 (7.42)	9.88 (7.76)	9.76 (7.30)	0.00	–0.04	–0.01
YSR-C total	55.53 (26.36)	56.94 (23.52)	53.00 (23.21)	0.02	–0.04	–0.10

MSCS-C: Multidimensional Social Competence Scale-Chinese version, *SM*: Social Motivation subscale; *SI*: Social Inferencing subscale, *DEC*: Demonstrating Empathic Concern subscale, *SK*: Social Knowledge subscale, *VCS*: Verbal Conversation Skills subscale, *NSS*: Nonverbal Sending Skills subscale, *ER*: Emotional Regulation subscale, *AQ-10-C*: Autism Spectrum Quotient-10 items-Chinese version, *YSR-C*: Youth Self-Report-Chinese version, *WIT*: Withdrawn subscale, *SOM*: Somatic Complaints subscale, *ANX*: Anxious/Depressed subscale, *SOC*: Social Problems subscale, *THO*: Thought Problems subscale, *ATT*: Attention Problems subscale, *DEL*: Delinquent Behavior subscale, *AGG*: Aggressive Behavior subscale, *INT*: Internalizing Behavior subscale, *EXT*: Externalizing Behavior subscale

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

Discussion

The present study reported the development and validation of a culturally-sensitive social competence training programme for Chinese adolescents with ASD (CBT-CSCA). Being the first social competence training programme developed in the East, the CBT-CSCA extends the effectiveness of social competence training to other cultural groups. The training programme was guided by established theoretical propositions, appropriate cultural adaptation, empirically supported training strategies and relevant contextual contents. The present study gives preliminary evidence to the validity of using such an approach in constructing culturally-sensitive and effective social interventions for persons challenged by ASD. Apart from the cultural components, CBT-CSCA also adopts an integrative multi-module approach and underlines the importance of context, behaviour, emotion and cognition in social competence learning.

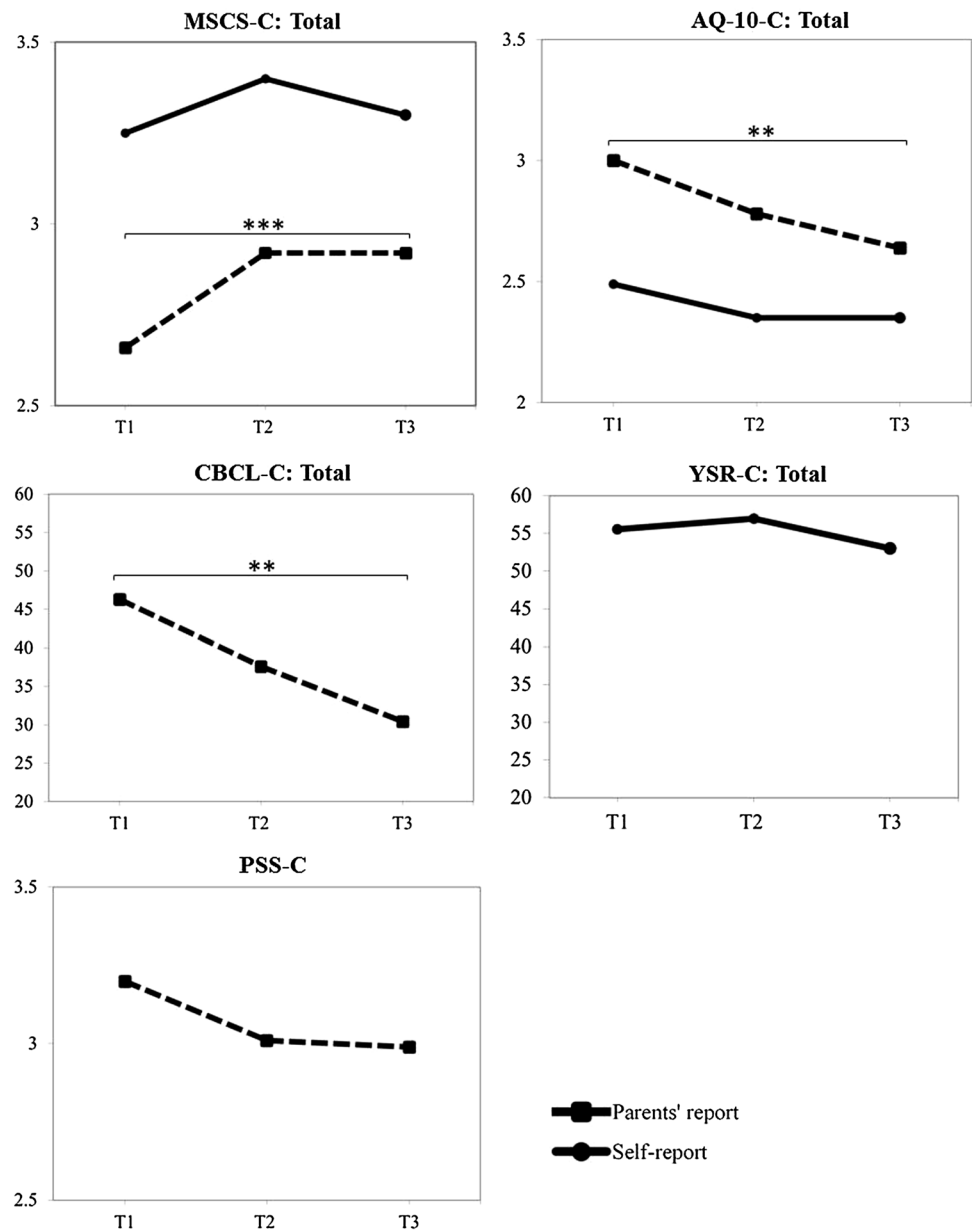
The obtained results in both the primary as well as the secondary measures were in support of the effectiveness of

CBT-CSCA for Chinese adolescents with ASD both at the completion of the training and at 3-month follow-up. However, there was a consistent discrepancy in the ratings by parents and young people with the former endorsing more marked positive changes than the latter.

In the primary measure of social competence with MSCS-C, the parents' report indicated an overall significant improvement in all social domains both at post-training and follow-up. The findings provided evidence support to the integrative multi-module approach of CBT-CSCA and its key training components. In contrast, adolescents' self-ratings on social competence across times only showed a small to medium effect size without reaching statistical significance.

In close examination, the observed discrepancy in results by parents and adolescents on social competence might be accounted by a significant difference in pre-training (T1) ratings on MSCS-C by the two parties (2.66 vs. 3.25). Regarding the local norming (Leung 2014), the parents' rating was below the clinical cut-off whereas the adolescents' rating

Fig. 2 Graphical representations of results across three time-points. * $p \leq .05$; ** $p \leq .01$; *** $p \leq .001$ for ANOVA across three time-points. *MSCS-C*: Multidimensional Social Competence Scale-Chinese version, *AQ-10-C*: Autism Spectrum Quotient-10 items-Chinese version, *CBCL-C*: Child Behavior Checklist-Chinese version, *YSR-C*: Youth Self-Report-Chinese version, *PSS-C*: Parental Stress Scale-Chinese version



was above. This discrepancy inevitably limited the possible positive effects to emerge in statistical analysis. There might be a few possible reasons to explain the disparity in ratings between the parents and young persons. Firstly, the tendency for the subjects to perceive themselves in a more positive social light was related to a lack of self-understanding and inaccurate self-views commonly found in the ASD population (Zahavi 2010). Secondly, the adolescents might choose to present themselves in a socially desirable manner due to cultural practice (e.g. saving face in Chinese culture) or developmental need (e.g. maintaining a positive self-image). Lastly, an overstating tendency as a help-seeking strategy on the part of the parents should not be disregarded. All these possibilities have significant implications for outcome

research in ASD in particular when ratings from different parties or cultures are involved.

Regarding the secondary measures, improvements in autistic symptoms, general psychopathology and parental stress were observed. Similar to the observation in social competence, parent-ratings on AQ-10-C reflected a significant reduction of autistic symptoms whereas the subjects' self-ratings only showed a reduction trend of medium effect. Also, improvement in general psychopathology was reflected in the decrease in CBCL-C ratings by the parents, with significant positive changes in both internalising and externalising behaviours. However, the results on YSR-C by the subjects only showed a trend of positive changes, more markedly upon completion of the training than at follow-up.

The positive results on autistic symptoms and general psychopathology in the present study support the spillover effect of social competence training on improving the related symptoms of ASD. The inclusion of emotion and cognition components in CBT-CSCA is considered to be contributive to the observed significant positive changes. The findings also support the proposition that ASD is primarily a social development disorder and addressing social deficits are a centrality approach for ASD (Chan et al. 2014; Klin et al. 2007).

Mothers of adolescents with ASD were known to have higher levels of emotional distress than mothers with children who have other types of disabilities (Abbeduto et al. 2004; Wang et al. 2013), and their mood symptoms were found to associate with child characteristics and support network available (Barker et al. 2011). In this study, the reduction in parental stress across pre- and post-training could probably be mediated by the positive changes in the adolescents' social competence and general psychopathology.

Taking all the results together, the CBT-CSCA appears to be able to help Chinese adolescents with ASD to function significantly better in social interactions and the improvement also cascades to other behavioural and emotional aspects of the individuals as well as the stress of parents.

Implications

Despite growing evidence of research in social competence training in adolescents with ASD across the globe, studies carried out in the Chinese culture were lacking. The present study was the first study demonstrating the use of an effective treatment for an underserved population, high-functioning adolescents with ASD in the Chinese culture. Unlike common practice of translating and adopting foreign-developed training program, the CBT-CSCA was locally-developed, with an incorporation of culturally-sensitive training contents and activities. The programme was not only theoretically-valid and empirically-supported. It also accommodates the unique cultural needs of Hong Kong adolescents and the feasibility of running a 15-weekly programme in a community-based training centre. The CBT-CSCA also served as an exemplar of developing local treatment programmes via cultural adaptation in the mental health setting.

Limitations

Although the current study demonstrated effectiveness in improving and maintaining overall social competence in adolescents with ASD, there were a few limitations to these findings. The present study adopted a repeated-measure paradigm. A more rigorous research design with a larger sample size and an inclusion of a control group will be needed to validate the effectiveness of the programme in the future.

The current study employed only parents' report and adolescents' self-report as the outcome measures. Future research may include additional third-party assessments and behavioural rating to establish the validity of the findings further.

Conclusion

The CBT-CSCA demonstrated the effectiveness in improving social competence among adolescents with ASD in Hong Kong and the gains were sustained 3 months after the training. The programme also brought improvements in autistic symptoms, general psychopathology and parent stress. The study provided evidence support to a culturally-sensitive social competence training programme grounded in the CBT model.

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Author Contributions RC and SY developed the study. CL wrote the first draft of the manuscript under the supervision of RC & SY. DN performed the statistical analysis and wrote the results part. RC revised and finalized the manuscript.

Compliance with Ethical Standards

Conflict of interest The authors have no conflicts of interest.

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