

Outcomes of an acceptance and commitment therapy-based skills training group for students with high-functioning autism spectrum disorder: A quasi-experimental pilot study

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Abstract

Autism spectrum disorder is characterized by social impairments and behavioural inflexibility. In this pilot study, the feasibility and outcomes of a 6-week acceptance and commitment therapy-based skills training group were evaluated in a special school setting using a quasi-experimental design (acceptance and commitment therapy/school classes as usual). A total of 28 high-functioning students with autism spectrum disorder (aged 13–21 years) were assessed using self- and teacher-ratings at pre- and post-assessment and 2-month follow-up. All participants completed the skills training, and treatment satisfaction was high. Levels of stress, hyperactivity and emotional distress were reduced in the treatment group. The acceptance and commitment therapy group also reported increased prosocial behaviour. These changes were stable or further improved at the 2-month follow-up. Larger studies are needed to further evaluate the benefits of acceptance and commitment therapy for autism spectrum disorder.

Keywords

acceptance and commitment therapy, adolescents, autism spectrum disorder, cognitive behavioural therapy, high-functioning, mindfulness, skills training, treatment

Introduction

Autism spectrum disorder (ASD) is characterized by impairments in social interaction and communication, as well as restricted and repetitive behaviours and interests (American Psychiatric Association, 1994). Psychiatric comorbidity is common in individuals with ASD, including other neurodevelopmental disorders such as attention-deficit hyperactivity disorder (ADHD) and Tourette's syndrome, as well as anxiety and depression (Abdallah et al., 2011; Ghaziuddin et al., 2002; Hofvander et al., 2009; Vickerstaff et al., 2007). ASD is also associated with deficits in executive function (EF), which include difficulty with higher order cognitive skills such as planning, strategy use, cognitive flexibility, working memory and inhibition (Happe et al., 2006; Hill and Frith, 2003; Pennington and Ozonoff, 1996). Difficulties in executive functioning interfere with efficient attainment of cognitive or behavioural goals (Christ et al., 2007; Kenworthy et al., 2008). Individuals with ASD often show restricted behaviour patterns (such as rituals and routines) which can limit their

ability to effectively adjust to situational demands and is often seen as psychological inflexibility (Esbensen et al., 2009). Despite average or above average intellectual capacity, autistic traits may complicate performance in many everyday situations, thus leading to stress. Furthermore, preliminary studies have found that autistic traits may be associated with both self-perceived stress/distress and restricted ability to cope with stressors (Hirvikoski and Blomqvist, 2013); for example, people with autism may not

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have the ability and/or willingness to seek social support which can often reduce stress in other populations.

There is no pharmacological treatment of the core symptoms of ASD. There are behavioural treatments available that have been determined to be best practice for skill building in people with autism, and these include social skills training (Reichow et al., 2012). Additionally, some cognitive behavioural therapy (CBT) interventions have been adapted to address common co-existing psychological problems, such as anxiety and subjective stress for people with ASD (Wood et al., 2009). One contextual behavioural treatment, dialectic behaviour therapy (DBT), has been shown to be effective for adults with ADHD, although it has not been tested in individuals with ASD (Hirvikoski et al., 2011). The literature on applied behaviour analysis-based treatments for people with high-functioning ASD is still limited and adapted treatment protocols are therefore of current interest for promoting health, facilitating self-management and reducing stress in ASD.

Acceptance and commitment therapy (ACT) is a contextual behaviour therapy, a group of interventions based on CBT that also includes additional techniques such as cognitive defusion, acceptance, mindfulness, values and commitment methods. ACT teaches people to notice and accept thoughts and feelings, even unpleasant ones. The goal of an ACT therapy is to increase psychological flexibility, which refers to the ability to non-judgementally experience thoughts, emotions and body sensations, to act effectively upon situational demands, and take action towards personally chosen values and goals. ACT has proven to be effective in a diverse range of clinical conditions such as anxiety disorders, stress and substance abuse (Bohlmeijer et al., 2011; Twohig et al., 2010). Moreover, ACT has been successfully evaluated in chronic and complex conditions such as pain, epilepsy and schizophrenia (Gaudio and Herbert, 2006; Lundgren et al., 2006; Wicksell et al., 2011), as well as in psychiatric conditions frequently associated with ASD, such as anxiety and depression (Hayes et al., 2006).

In our clinical experience, a common problem in high-functioning ASD is experiential avoidance that may arise from the vulnerability to stress and experiences of negative life events. ACT suggests that experiential avoidance is one of the roots of psychopathology and refers to human beings' tendencies to avoid not only dangerous situations or events but also thoughts and feelings associated with these events. Individuals with ASD also exhibit inflexibility which may be associated with a propensity to perseveration in problem solving, aversion to uncertainty, intellectualization, rule-governed behaviours, literalness, sensory over- and/or under-sensitivity, as well as deficits in the perception of self and others. Experiential avoidance may further increase psychological inflexibility in people with ASD and further narrow the individual's behaviour repertoire. In ACT, experiential avoidance is targeted by an attempt to increase psychological flexibility mainly through two

sets of procedures: acceptance and mindfulness skills and behaviour change procedures. Acceptance and mindfulness skills are aimed at helping the individual cope with difficult thoughts, emotions and body sensations, thereby breaking experiential avoidance patterns. Behaviour change procedures, such as helping individuals identify values and teaching committed action skills to help reach their goals, are aimed at helping the individual to define important life directions and act according to them.

To the best of the authors' knowledge, no studies have evaluated the use of ACT in individuals with ASD. Modifying the ACT model in ways that make it feasible to use with people who have ASD may help reduce stress and emotional distress, and increase psychological flexibility in people with ASD. The aim of this pilot study was to evaluate the feasibility and outcomes of a modified ACT protocol for adolescents and young adults with high-functioning ASD.

Methods

The study is designed as a quasi-experimental two-group trial (intervention/waiting list) study with repeated measures. The feasibility and outcomes of an ACT-based skills training group were evaluated for adolescents and young adults with high-functioning ASD.

Study setting and recruitment process

Participants were recruited at a special school serving approximately 50 students with high-functioning ASD in Stockholm, Sweden. Six school classes were included in the study (3 junior high school classes and 3 high school classes), with 5–7 students in each class (13–21 years old). Two middle school classes were excluded (students > 13 years old).

School staff, parents and students received written initial practical and theoretical information about the study, adjusted to each recipient group. School staff and parents were also informed orally at a school staff meeting and a parent meeting, respectively. Written informed consent was given by parents for students younger than 18 years old and by the students themselves if they were 18 years old or older. Before entering the skills training group, the participating students were informed about study procedures and the content of the skills training and that they could stop the skills training at any time without further explanation. All measurements and the skills training were carried out within the school setting, and study procedures were performed in accordance with the Declaration of Helsinki (World Medical Association General Assembly, 2004). The waiting list group received skills training after the study was completed. The current project has previously been reviewed and accepted by the Department of Psychology, Uppsala University, and presented in a master's degree thesis by the first author (J.P.).

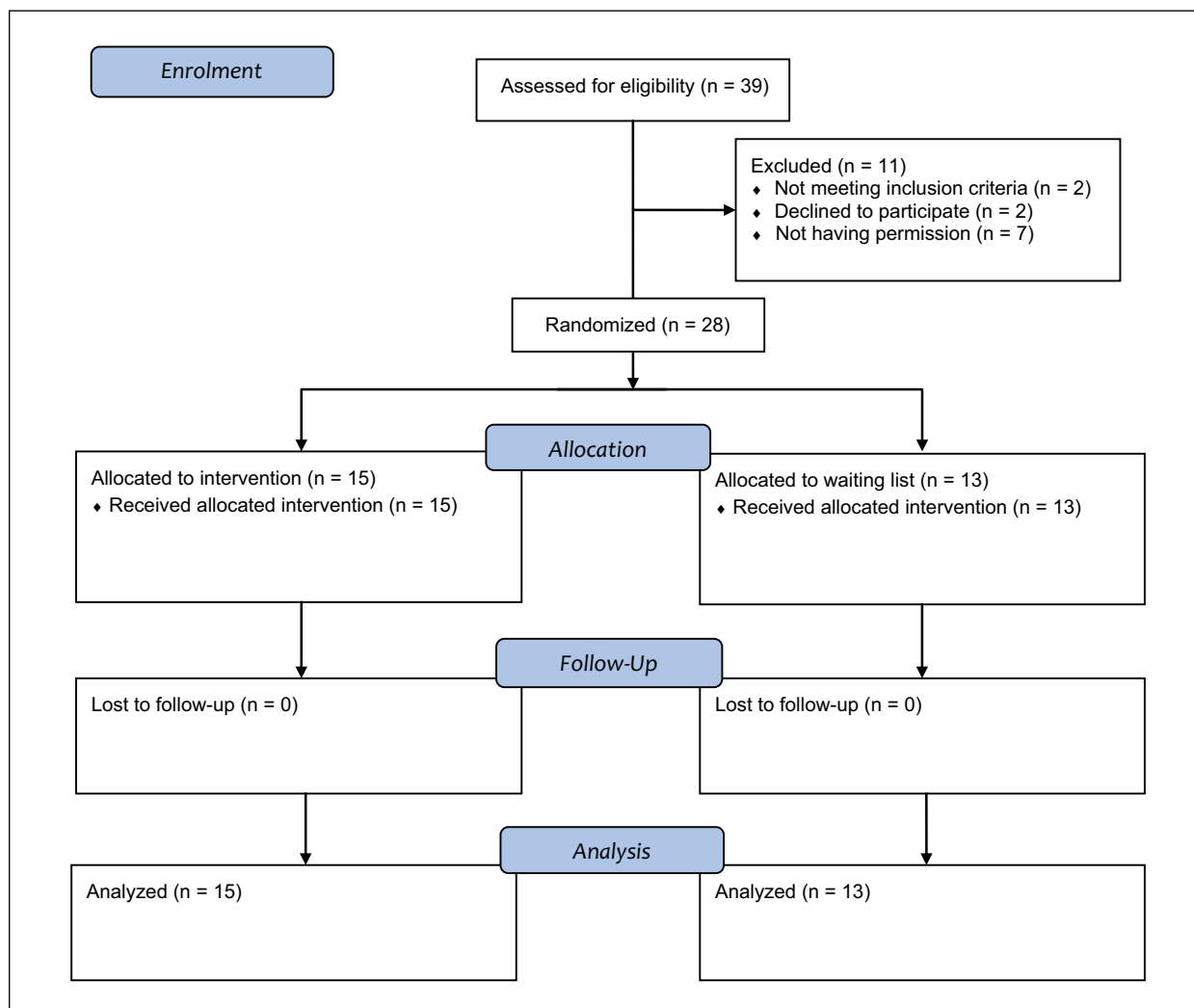


Figure 1. Flow chart.

The study groups (treatment vs control group)

Many students with ASD have difficulty with changes to their environment; therefore, skills training was conducted within the students' usual school class groups. No individual randomization was performed. The six participating school classes were randomized to either skills training or the waiting list. A simple class-wise randomization was performed using folded opaque cards placed in a container and mixed. The container was placed so that the cards could not be seen and the group leader then drew a card for each class group.

Participants

Students were eligible to participate if they were previously diagnosed with *Diagnostic and Statistical Manual of Mental Disorders* (4th ed.; *DSM-IV*) (high-functioning) ASD, 13 years old or older, had given their (or their parents) written

informed consent and were able to attend the first session of the programme. Students with a differential diagnosis of mental retardation or selective mutism were excluded. Participants with other co-morbid disorders, such as ADHD and dyslexia, were included. A total of 39 students were screened for the study. In total, 11 of the students were not found to be eligible (Figure 1).

Measures

The study included measures of participant characteristics and outcome measures. Outcome measures were the Stress Survey Schedule (teacher- and self-ratings), the Strengths and Difficulties Questionnaires (SDQ; teacher- and self-ratings), and the Beck Youth Inventories (BYIs; self-ratings). These measures were administered 1 week before entering the intervention (pretreatment/T1), 1 week after the intervention was completed (post-treatment/T2) and 2 months after completion of the intervention (2-month follow-up/T3).

Feasibility

Feasibility was evaluated in terms of completion of the skills training programme (a drop-out was defined as attending fewer than six sessions); attendance at skills training sessions (number of sessions attended); number of mindfulness training occasions at school between the sessions (i.e. how many times the student actively participated at daily mindfulness classroom training under supervision of the students' teachers, see section 'ACT-based skills training group'); and by using an evaluation questionnaire covering aspects of treatment satisfaction on a 5-point Likert scale from *very low* to *very high* satisfaction. Items on the questionnaire asked participants about satisfaction with treatment contents both for the sessions and the between-session mindfulness training. Participants were specifically asked about satisfaction with the group format.

Outcome measures

The Stress Survey Schedule. Behaviours related to stress were assessed using the Stress Survey Schedule for Autism and Other Developmental Disorders (Grodén et al., 2001). The original Stress Survey Schedule is an other-report scale. In this study, teachers completed the survey. In addition, the scale was also adjusted into a self-report instrument completed by the students. The Stress Survey Schedule consists of 49 items scored on a 5-point Likert scale. Based on exploratory and confirmatory factor analyses, the items are categorized into eight subscales representing categories of situations that children with ASD and other developmental disabilities normally perceive as stressful: changes, anticipation, social interaction, pleasant events (generally pleasant events that can be perceived as stressful by an individual with ASD, for example, birthday gifts or having a conversation), sensory stimuli, unpleasant events, food situations and rituals. The internal consistency of the subscales is generally good (Cronbach's $\alpha = .81-.87$) (Grodén et al., 2001). In the current study, only the Stress Survey Schedule total scores are reported.

The SDQ. The SDQ (Goodman, 1999) is a brief behavioural screening instrument developed for 3- to 16-year-old children, consisting of 25 items. In this study, teachers and students completed the questionnaire. Each item is scored 0–2, where 0 is *not true*, 1 is *somewhat true* and 2 is *certainly true*. The scale has five subscales representing emotional symptoms, behaviour problems, hyperactivity/inattention, peer relationship problems and prosocial behaviour. On the first four subscales, higher scores indicate more problems, while on the last subscale, higher scores indicate fewer problems. The first four subscales are summarized to give a total score. The instrument's internal consistency is generally good (Cronbach's $\alpha = .70-.76$), except for behaviour problems (Cronbach's $\alpha = .52-.54$) (Goodman, 1999).

The BYIs. The BYIs (Beck et al., 2001) are a self-rating questionnaire that consists of five subscales, three of which were used in this study: anxiety, depression and anger. The internal consistency generally ranges between .89 and .94 (Beck et al., 2001). Each scale consists of 20 items scored *never*, *sometimes*, *often* or *always*. In this study, the three subscales were also summarized into a total score representing psychological distress. The BYIs have been evaluated in clinical samples of children and adolescents with autism, ADHD and Tourette's syndrome. The Swedish version has been adapted to Swedish conditions and evaluated for 9- to 18-year-old individuals.

ACT-based skills training group. An ACT protocol (Hayes et al., 2003) was modified to meet the specific challenges of having ASD. Skills training was provided to develop the participants' ability to cope with daily hassles and stressful situations, to break behavioural avoidance patterns, and to develop a broader behavioural repertoire. The skills training programme included the behavioural components normally included in an ACT intervention including the general principles of setting values, self as context (understanding the self that is observing and experiencing without judgement), defusion (strategies for reducing the tendency to make thoughts, images, and emotions concrete), acceptance (allowing thoughts to come and go without judgement), contact with the present moment (openly experiencing the here and now) and committed action (setting goals according to values and carrying them out). These components were applied in order to promote psychological flexibility. The ACT goal is to teach acceptance and mindfulness skills as a way of dealing with difficult thoughts, emotions and body sensations so as to increase the likelihood that the individuals can develop in personally chosen important life areas according to the individuals' values. A specific example might be a female adolescent who wants to be in school but refuses to go due to thoughts about not understanding what is expected of her. She has previous experiences of not understanding and feeling stupid. When thinking about going to school, emotions related to the previous failures are evoked and, owing to the fear of failing again, the adolescent refuses to go. In an ACT approach, the adolescent is taught acceptance and mindfulness skills in order to be able to deal with the emotions and thoughts that have become barriers to doing what is important to her, that is, going to school and learning.

The 6-week ACT-based skills training programme consisted of two 40-min group sessions per week and 6- to 12-min of daily mindfulness exercises in the classroom (mindfulness training occasions). These mindfulness training occasions were facilitated by the classroom teacher and consisted of listening to a CD containing instructions and mindfulness and acceptance exercises that was developed for this study and adjusted for adolescents with ASD. In order to facilitate training, shorter and less abstract exercises were presented earlier in the programme, while the longer

ones were presented later. For the group sessions, the group leader was a graduate psychology student (J.P.), under the supervision of an experienced mindfulness instructor and ACT therapist (second author (T.L.)). Students participated in an initial introductory session. Each subsequent session followed a similar format with a short opening mindfulness exercise, followed by a review of homework assignments, introduction of the theme of the particular session and finally, practice of the next individual mindfulness exercise and a review of new assignments. Homework assignments consisted of pencil-and-paper exercises (i.e. analysis of behaviour, values and behaviour goals and recording of stressful situations), mindfulness training on a regular basis using a CD with short, adapted mindfulness exercises, as well as behaviour change (i.e. adopting new behaviour strategies). Homework assignments were performed partly at school under the supervision of the students' teachers (daily mindfulness occasions) and partly at home (independently by the students or supported by their parents). The original ACT protocol was modified using shorter mindfulness exercises and simplified language, pictures and diagrams to explain theoretical concepts and metaphors, and portfolios containing treatment material. Furthermore, the students' overall needs with regard to routine persistence, clarity and planning were respected.

The central aims and components of the skills training are described as follows:

1. Acceptance of thoughts, feelings and body sensations using acceptance exercises.
2. Self as context, using mindfulness exercises (i.e. developing the ability to take different perspectives on one's own thoughts, emotions and body sensations).
3. Worksheets connecting values to more direct behaviour goals.
4. Identification of obstacles in order to carry out goal-directed behaviour.
5. Examination of the participant's solutions and alternative strategies in order to carry out goal-directed behaviour.
6. Illustration of the avoidance trap.
7. Seeing thoughts as thoughts and not as true obstacles to a valued life (defusion, that is, decreasing the literal meaning of thoughts).
8. Application of learned behaviour strategies and mindfulness techniques in stressful situations.

In addition, the skills training was modified to meet the unique challenges of ASD, as described below:

1. Small groups (4–6 participants).
2. Shorter individual mindfulness exercises than used in comparable programmes for other diagnostic groups or typically developing individuals (6–12 min of in-school practice).

3. Additional mindfulness exercises focusing on coping with perception and sensory over- and under-sensitivity, since perceptual distortions are central symptoms in ASD.
4. Individualized classroom training with a CD containing verbal instructions and mindfulness exercises.
5. Modified worksheets on stress management and functional analysis of behaviours.
6. Metaphors were visualized and used to a limited extent.

Statistical analyses

Data were analysed using statistical software SPSS version 20.0. The demographic data and background variables were analysed using Student's *t*-test for continuous variables and the chi-square test for category variables. An exploratory analysis was initially performed to assess normal distribution and potential outliers, and the assumptions for variance analyses were met. The outcome measures were analysed using a series of two-tailed mixed-design repeated measures analyses of variance (rmANOVAs), with group (skills training/waiting list checking) as a between-subjects factor, and the pre-intervention score (T1) and the post-intervention score (T2), as well as the 2-month follow-up score (T3) of the outcome measures, as a within-subjects repeated measure factor. In order to avoid type I errors due to many analyses of a small sample, no post hoc contrast analyses were performed, but general patterns in the results were interpreted. The effect sizes were expressed as partial eta-square (η_p^2) for efficacy measures and were interpreted using the guidelines proposed by Cohen (1988): 0.01 = small effect size, 0.06 = moderate effect size and 0.14 = large effect size. The correlation between teacher-ratings and student's self-ratings was analysed using the Pearson product-moment correlation. The alpha levels were set at $p \leq 0.05$ for significance and, for *p* values, $p \leq 0.10$ for a trend. Statistical trends were reported in order to avoid beta errors due to small sample sizes.

Results

Participant characteristics

As shown in Table 1, there were more male than female participants. Several participants had co-morbid disorders and had undergone some type of pharmacological treatment (mainly antidepressants and central nervous system stimulants). The distribution of participant characteristics was equal between the skills training group and controls, except that the skills training group included more girls.

Feasibility

According to the cut-off for drop-outs (those attending fewer than six sessions), all of the 15 participants in the

Table 1. Sample characteristics.

Characteristics	Total (N = 28)		ACT (n = 15)		Waiting list (n = 13)		χ^2 test
	n	%	n	%	n	%	
Male	21		9	60	12	92	$p = .049$
Current medication use	8		5	33	3	23	NS
Psychiatric co-morbidity							
ADHD	7		3	20	4	31	NS
OCD	3		2	13	1	8	NS
Dyslexia	3		1	7	2	15	NS
Specific phobias	4		2	13	2	15	NS
Age (years)	M (SD)		M (SD)		M (SD)		Student's <i>t</i> -test
	16.5 (2.0)		16.2 (1.4)		16.8 (2.5)		NS

ACT: acceptance and commitment therapy; ADHD: attention-deficit hyperactivity disorder; OCD: obsessive-compulsive disorder; SD: standard deviation.

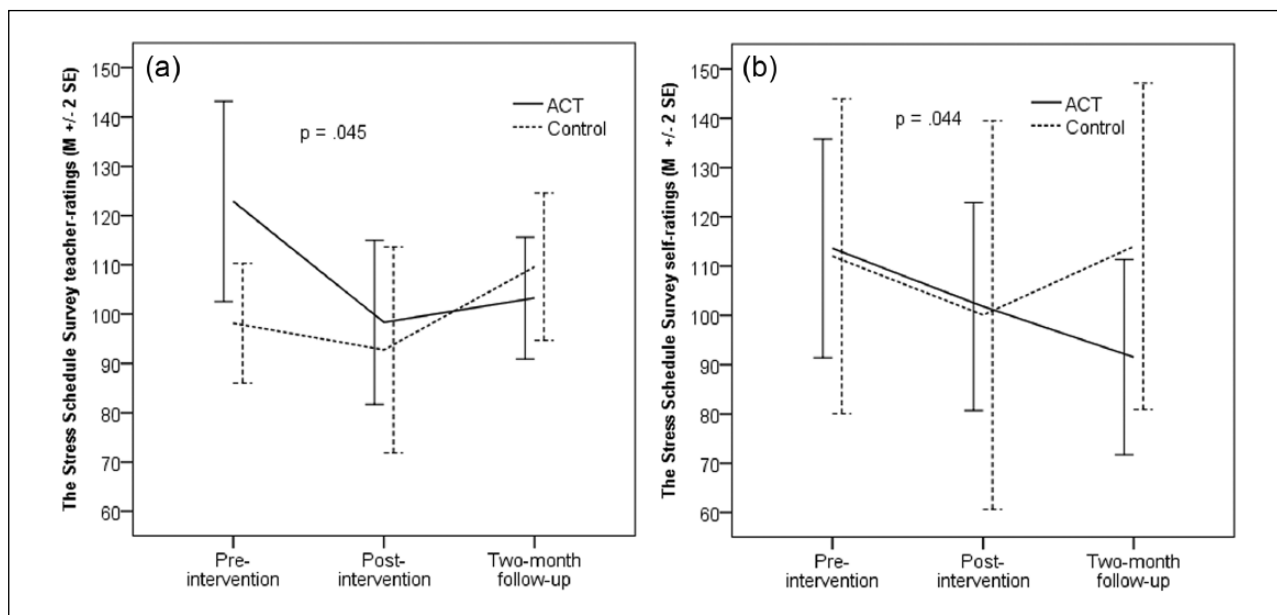


Figure 2. The analyses of the Stress Survey Schedule total scores showed a significant group-by-time interaction effect in both (a) teacher-ratings and (b) self-ratings from pre-intervention (T1) to the 2-month follow-up (T3).

ACT: acceptance and commitment therapy; SE: standard error.

skills training group completed the treatment, half of them attended all 12 sessions and the majority (93%), six sessions or more. Training occasions between sessions varied among participants with a total mean score of 2.5 (standard deviation (SD) = 1.5) per week, where the majority (53%) practised 3 days a week or more. The evaluation questionnaire showed high treatment satisfaction overall, and no adverse events were reported. The majority (93%) reported high or very high satisfaction with the treatment content and the group-session format. Exercises on CDs were reported to be easy or very easy by the majority (64%), while the other participants reported the exercises neither easy nor difficult.

Outcome measures

The Stress Survey Schedule. The mean values and standard errors of the Stress Survey Schedule teacher- and self-ratings are shown in Figure 2. The overall effect of time on stress was observed as a trend in the self-ratings ($F_{(2, 52)} = 2.78, p = .071, \eta_p^2 = .10$), and as a significant effect in the teacher-ratings ($F_{(1.60, 41.52)} = 3.54, p = .048, \eta_p^2 = .12$). However, there was also a significant interaction effect in both self-ratings ($F_{(2, 52)} = 3.31, p = .044, \eta_p^2 = .11$) and teacher-ratings ($F_{(1.60, 41.52)} = 3.63, p = .045, \eta_p^2 = .12$), indicating a difference in the Stress Survey Schedule scores of the two groups over time. In the ACT skills training group,

a decrease was observed from pre- to post-intervention, and this reduction in stress was stable or further reduced at the 2-month follow-up. Among controls, an increase in stress from post-intervention to the 2-month follow-up was observed in both teacher- and self-ratings (Figure 2). No general differences between the skills training group and controls were observed either in the self-ratings or in the teacher-ratings (between-group effects, both p values > .10). The total Stress Survey Schedule score in self-ratings did not correlate with the total stress score in teacher-ratings at any of the measuring time points (all p values > .10).

SDQ. The mean values and *SDs*, as well as the statistics of the SDQ self-ratings, are presented in Table 2, while the mean values and standard errors for the SDQ teacher-ratings are shown in Figure 3. In self-ratings, statistically significant group-by-time interaction effects were observed on the SDQ subscales hyperactivity ($p = .026$) and prosocial behaviour ($p = .034$), indicating a reduction in self-perceived hyperactivity and increased prosocial behaviour in the skills training group. In the self-ratings of the SDQ, no general differences between the skills training group and controls were observed (between-group effects, all p values > .10). In addition, no statistically significant overall effects of time were observed; however, a statistical trend was observed on the SDQ subscale hyperactivity ($p = .089$). The significant group-by-time interaction effects indicated differences over time in the two groups in the teacher-ratings SDQ total score, ($F_{(1.79, 46.50)} = 5.63, p = .008, \eta_p^2 = .18$), as well as the SDQ subscales emotional symptoms ($F_{(2, 52)} = 6.22, p = .004, \eta_p^2 = .19$) and hyperactivity ($F_{(1.60, 41.67)} = 5.67, p = .010, \eta_p^2 = .18$) (Figure 3). There was no statistically significant general difference between the intervention group and controls (between-group effects, all p values > .10). A statistically significant overall effect of time on the repeated measure was observed for the SDQ total score ($F_{(1.79, 46.50)} = 4.89, p = .014, \eta_p^2 = .16$), as well as for the SDQ subscales emotional symptoms ($F_{(2, 52)} = 6.52, p = .003, \eta_p^2 = .20$), peer relationship problems ($F_{(2, 52)} = 10.20, p = .000, \eta_p^2 = .28$) and prosocial behaviour ($F_{(2, 52)} = 3.36, p = .042, \eta_p^2 = .11$). Taken together, these results indicated both general changes in symptoms and differences in how the two groups reacted over time. The symptom reduction appears to be larger in the skills training group than in controls, and treatment effects were maintained to the 2-month follow-up (Figure 3), while an increase in symptoms was observed in the control group from T2 to T3 regarding many of the measures.

Correlations between the self-rated SDQ subscales and corresponding teacher-ratings were significant on the SDQ subscales emotional symptoms, conduct and peer relationship problems and at a level of a statistical trend in prosocial behaviour. Thus, only the self-ratings of the subscale hyperactivity did not correlate significantly with teacher-ratings (Pearson's r and p values are presented in Table 2).

Table 2. Means and standard deviations (*SDs*) as well as statistics from the repeated measures ANOVAs on self-ratings of the SDQ.

	Pre-skills training	Post-skills training	2- month follow-up	Effect of time	Between-group effect	Group-by-time interaction effect	Correlation with teacher-rating at baseline
The SDQ total score	ACT C	14.00 (5.75) 11.92 (5.98)	13.20 (6.46) 10.92 (5.17)	11.13 (4.97) 11.92 (6.78)	$F_{(2, 52)} = 1.39; p = .258; \eta_p^2 = .05$ NS	$F_{(2, 52)} = 1.95; p = .152; \eta_p^2 = .07$ NS	$r = .23$ $p = .248$
The SDQ subscales							
Emotional symptoms	ACT C	3.87 (2.97) 2.38 (2.50)	3.27 (3.31) 2.62 (1.85)	2.93 (2.60) 2.85 (2.51)	$F_{(2, 52)} = .27; p = .768; \eta_p^2 = .01$ NS	$F_{(2, 52)} = 2.13; p = .13; \eta_p^2 = .08$ NS	$r = .42$ $p = .027$
Hyperactivity/inattention	ACT C	4.07 (2.05) 4.54 (2.57)	4.73 (2.19) 3.23 (2.68)	3.20 (1.61) 3.62 (2.63)	$F_{(2, 52)} = 2.54; p = .089; \eta_p^2 = .09$ NS	$F_{(2, 52)} = 3.90; p = .026; \eta_p^2 = .13$ NS	$r = .18$ $p = .366$
Conduct problems	ACT C	2.33 (1.80) 1.85 (1.35)	2.07 (1.79) 2.08 (1.89)	2.07 (2.12) 2.23 (1.83)	$F_{(2, 52)} = .51; p = .951; \eta_p^2 = .00$ NS	$F_{(2, 52)} = .91; p = .410; \eta_p^2 = .03$ NS	$r = .54$ $p = .003$
Peer relation problems	ACT C	3.73 (1.91) 3.15 (1.99)	3.13 (1.41) 3.00 (1.35)	2.93 (1.67) 3.31 (2.21)	$F_{(2, 52)} = .93; p = .402; \eta_p^2 = .03$ NS	$F_{(2, 52)} = 1.27; p = .289; \eta_p^2 = .05$ NS	$r = .50$ $p = .007$
Prosocial behaviour ^a	ACT C	7.27 (1.91) 7.38 (1.39)	7.33 (2.02) 6.69 (2.18)	7.53 (1.77) 6.15 (2.30)	$F_{(2, 52)} = 1.54; p = .224; \eta_p^2 = .06$ NS	$F_{(2, 52)} = 3.61; p = .034; \eta_p^2 = .12$ NS	$r = .362$ $p = .058$

ANOVA: analysis of variance; ACT = acceptance and commitment therapy-based skills training group; C = control group; SDQ: Strengths and Difficulties Questionnaire.
^aThe SDQ subscale prosocial behaviour is not included in the SDQ total score. In contrast to other SDQ subscales, higher scores in the SDQ prosocial behaviour indicate better adjustment.
 Bold values = statistically significant p -values.

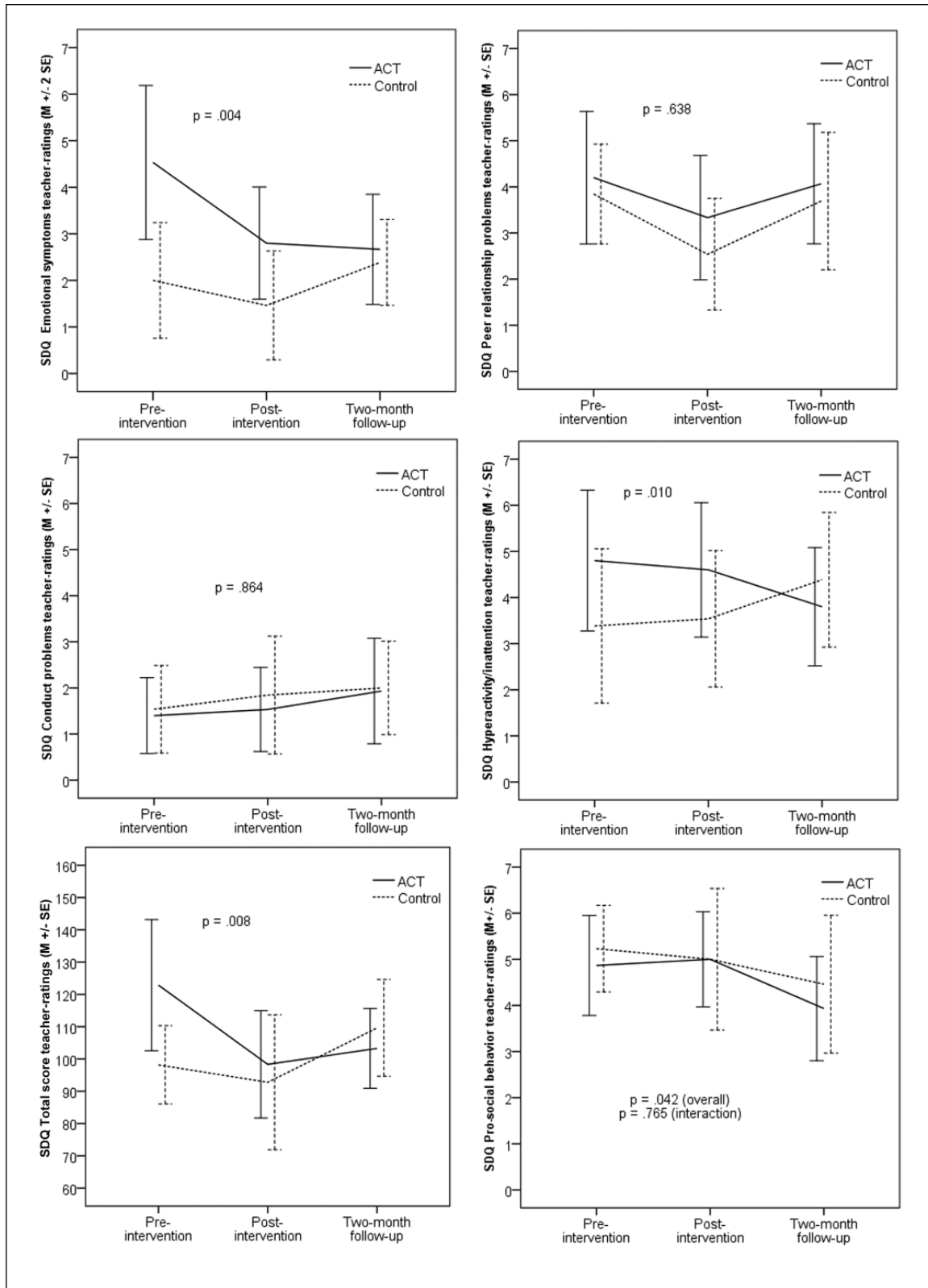


Figure 3. In the teacher-ratings of the SDQ, significant group-by-time interaction effects were observed on the emotional symptoms and hyperactivity/inattention subscales as well as in the SDQ total score, while on the prosocial behaviour subscale, an overall effect of time was observed. It should be noted that in contrast to other SDQ subscales, higher scores in the SDQ prosocial behaviour indicate better adjustment.

ACT: acceptance and commitment therapy; SE: standard error; SDQ: Strengths and Difficulties Questionnaire.

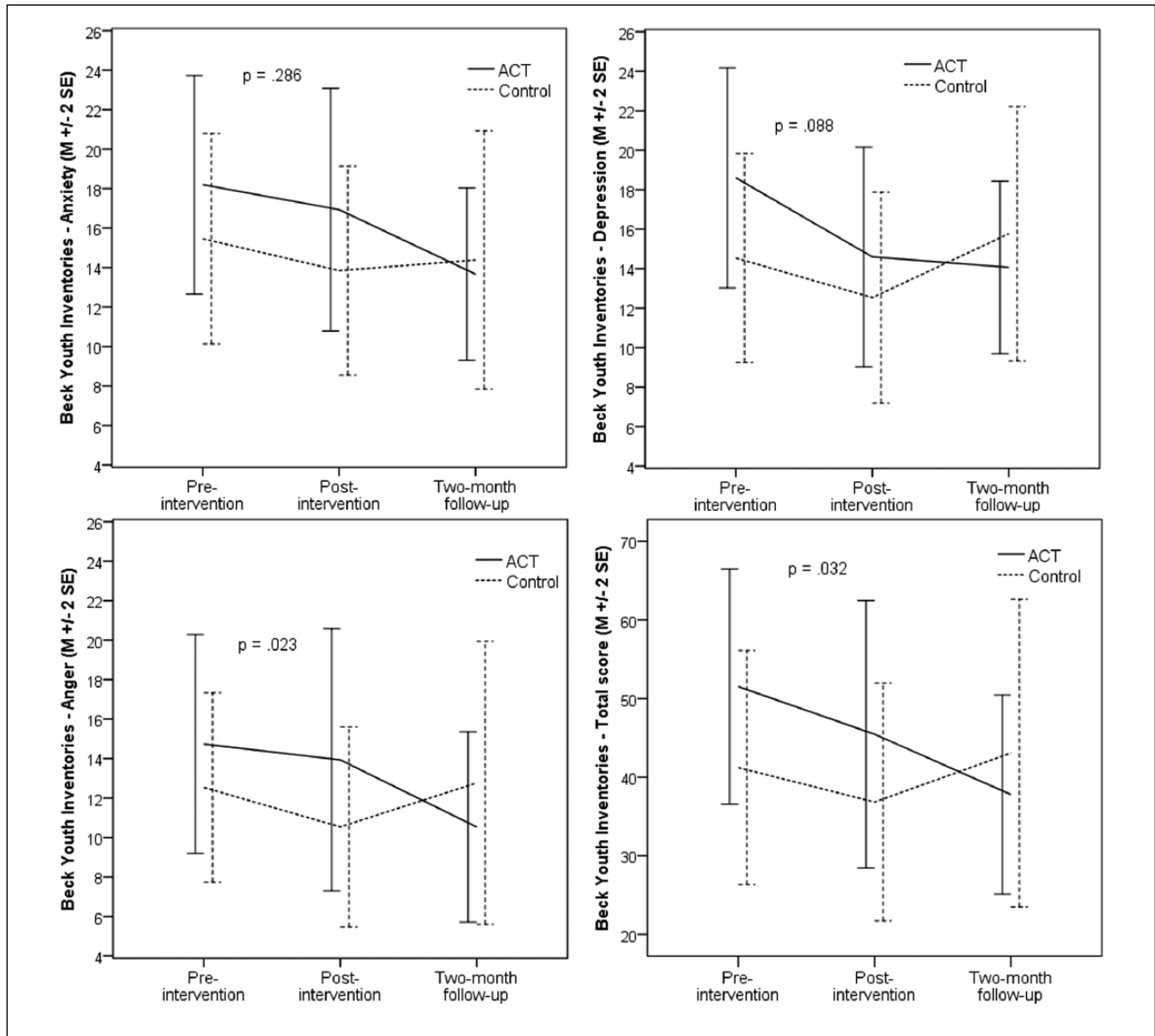


Figure 4. The analyses of the self-rated BYIs showed significant group-by-time interaction effects in anger and the BYIs total score, as well as a statistical trend in depression.

ACT: acceptance and commitment therapy; SE: standard error; BYIs: Beck Youth Inventories.

The BYIs. The BYIs' mean values and *SDs* are shown in Figure 4. In the BYIs total score, a group-by-time interaction effect was observed ($F_{(2, 52)} = 3.68, p = .032, \eta_p^2 = .12$) indicating that the two groups reacted differently over time. In the skills training group, psychological distress was reduced from pre- to post-treatment and was further reduced at the 2-month follow-up, while in the control group, psychological distress was increased from T2 to T3. There was also an interaction effect on the anger subscale ($F_{(2, 52)} = 4.07, p = .023, \eta_p^2 = .14$), and a statistical trend was observed in the interaction effect for the depression subscale ($F_{(1.56, 40.66)} = 2.82, p = .083, \eta_p^2 = .10$). The general pattern of the results was similar to those in the total score

(Figure 4). On the BYIs subscale anxiety, there was no significant interaction effect. Overall, there were no statistically significant general differences between the skills training group and controls (between-group effects, all p values $> .10$). In addition, no statistically significant overall effects over time were observed; however, a statistical trend was observed for depression ($F_{(1.56, 40.66)} = 2.97, p = .074, \eta_p^2 = .10$).

Discussion

In this pilot study, comparing an ACT-based skills training group with controls (school classes as usual/waiting list) in

a special school setting, good treatment feasibility was observed together with positive outcomes in measures of stress, hyperactivity, prosocial behaviour and emotional symptoms.

An explicit goal was to adapt the skills training to adolescents and young adults with ASD with co-morbid mental health problems within a special school setting in order to increase the ecological validity. Moreover, additional goals were that the skills training would motivate the majority of participants to complete the programme (e.g. by being perceived as relevant and interesting by the students), and the programme would be perceived as acceptable by school staff. These goals were attained. In the skills training group, the overall treatment satisfaction was reported to be high and all participants completed a majority of the programme sessions. The adaptations of the ACT protocol made for students with ASD (such as visual-based worksheets, mindfulness training in the classroom and a small group setting) were seen as meaningful by the students. The daily mindfulness training was administered in school, optimizing the effectuation of the training as well as being consistent with the students' need of routines and familiarity. Altogether, the feasibility in the special school setting was good.

In the outcome measures, a decrease in self- and teacher-reported stress, hyperactivity and emotional symptoms was observed in the skills training group, while self-reported prosocial behaviour was increased. The effect sizes in the significant group-by-time interaction effects were generally large. A general pattern of the results indicated maintenance of the obtained effects up to the 2-month follow-up in the skills training group, while in the control group, symptoms were generally increased from T2 (post-treatment period) to T3 (2-month follow-up). All students underwent a series of school exams during this period, and the newly acquired skills might have had a protective effect on stress for the students in the intervention group. There were no general differences in the school situation between the intervention group and the control group.

To the best of the authors' knowledge, this is the first study to adjust an ACT protocol to adolescents and young adults with ASD. The promising results indicate that ACT might constitute a valuable approach for facilitating everyday life and alleviating symptoms of stress and psychological distress. The results are also in line with the emerging empirical support for ACT as a valuable approach not only for adults but also for children and adolescents (Coyne et al., 2011). Interestingly, reduced symptoms of hyperactivity were observed, as this has been found in a study on another contextual behavioural therapy, that is, DBT-based skills training in ADHD groups (Hirvikoski et al., 2011). Thus, acceptance and non-judgemental approaches might have beneficial effects on self-regulation in ASD.

The current treatment was aimed at supporting individuals with ASD in elaborating skills that will potentially generate a greater ability to cope with uncomfortable mental

events and sensory inputs, and help them to use goal-directed behaviours instead of relying on restricted behaviour patterns. For example, in social settings, the individual might be able to have (accept) self-critical thoughts and at the same time (mindfully) stay in an appropriate conversation (behavioural goal). A central concept in ACT is psychological flexibility defined as the ability to non-judgementally experience thoughts, emotions and body sensations, to act effectively upon situational demands, and take action towards personally chosen values and goals. The opposite of psychological flexibility is psychological inflexibility, which correlates highly with psychological and psychiatric problems (Levin et al., 2012). According to the theories upon which ACT is based, a key component in the development of psychological flexibility is the ability to shift perspectives such as I/You, Here/There, Now/Then. It has been suggested that applying different perspectives is a problem for persons with autism spectrum disorders (ASD) (Rehfeldt et al., 2007), and ACT may be helpful in building this skill in this population.

Practising mindfulness, acceptance and values skills may increase the ability to understand the perspective of others and increase psychological flexibility. Thus, the increase in self-perceived prosocial behaviour in this study may be interpreted as an increased ability to understand the perspectives of others. However, the analysis of active components in the current treatment goes beyond the scope of this pilot study, and the effect that mindfulness, acceptance and values-based interventions have on basic perspective-taking skills and psychological flexibility requires further attention. Nevertheless, the study supports ACT as a means to manage stress and emotional symptoms in ASD.

In this pilot study, several methodological issues affect the interpretation of the results. To measure self-perceived stress, an other-report questionnaire (the Stress Survey Schedule) was modified into a self-report form. This format has not been validated. Interestingly, no correlation was observed between self- and teacher-reported stress, indicating that subjective stress may be a concept which differs from collateral information on stress. A possible explanation could be the students' difficulty in communicating stress that makes teachers' interpretations vague. Alternatively, it could be argued that individuals with AS may have general difficulties in interpreting their own affect (Lombardo et al., 2007), leading to over- or underestimation of the symptoms. However, in this study, we observed significant correlation with almost all subscales of another questionnaire, the SDQ, indicating a good inter-rater agreement between the students and the teachers.

With regard to the outcome measures, it should also be noted that the questionnaires used were selected on the basis of clinical experience and are not fully theory-consistent with contextual behaviour science (Hayes et al., 2011). Therefore, there may have been treatment effects that we did not measure, thus committing type II errors. Moreover,

performing several analyses on small samples increases the risk of type I errors (random significances). However, we only performed a priori planned statistical analyses, which should decrease the risk of type I error. Moreover, the general pattern in the outcome measures was consistent between the self- and teacher-ratings, as well as across different questionnaires.

A major limitation was the small sample size and low statistical power (increased risk of type II errors), which also limited the analyses of possible effects of background variables (such as IQ, gender, age and co-morbidity) on the treatment outcome. The large age range of the participating students due to recruitment at the special school setting may not have been optimal; for example, two of the measures used were out of the valid age range for the older participants. Furthermore, because of the quasi-experimental design, differences between the skills training group and controls may have influenced the result. For an appropriate evaluation of efficacy, an individualized randomization should be performed in future studies. The treatment group consisted of more girls than the control group, which may have also had an impact on the outcome. However, no general between-group differences in the skills training group and the controls were observed in the rmANOVAs. A further limitation was lack of systematic assessment of treatment fidelity (e.g. by rating tapes of treatment sessions or using therapist checklists). Therefore, the specific ACT procedures and modifications were not clearly measured, and thus, the degree to which the procedures were implemented as described cannot be determined.

Larger studies and replications of the skills training programme are needed to further evaluate ACT for adolescents and young adults with ASD in different settings. Moreover, theory-consistent measures should be applied in future studies, including component analyses of central concepts in ACT, such as psychological flexibility.

In summary, the current results suggest that the ACT-based skills training programme may be a promising treatment which is feasible in a special school setting and has the potential to be effective for reducing stress and psychiatric symptoms in adolescents and young adults with ASD.

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