



Acceptance and commitment therapy for autistic adults: An open pilot study in a psychiatric outpatient context



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1. Introduction

Autism spectrum disorder (ASD) is a neurodevelopmental condition characterized by persistent social interaction challenges, alongside restricted, repetitive behaviors and interests leading to functional impairment (APA, 2013). The prevalence in both children and adults is at least 1.7% (Baird et al., 2006; Bolte et al., 2019; Brugha et al., 2016; Idring et al., 2015). ASD is associated with challenges in executive function, such as planning, working memory, and inhibition, impairing the ability to cope with daily demands and reach long term goals (Christ, Holt, White, & Green, 2007; Kenworthy, Yerys, Anthony, & Wallace, 2008). Furthermore, ASD is associated with self-perceived stress (Bishop-Fitzpatrick, Minschew, Mazefsky, & Eack, 2017; DeLongis, Folkman, & Lazarus, 1988; Hirvikoski & Blomqvist, 2015), reduced quality of life (Jonsson et al., 2017; Tobin, Drager, & Richardson, 2014), co-occurring psychiatric symptoms, primarily anxiety and depression (Lugnegard, Hallerback, & Gillberg, 2011; Simonoff et al., 2008), and premature mortality (Hirvikoski et al., 2016). As many as 70% of autistic adults report at least one major depressive episode during their lifetime, while 50% report an anxiety disorder (Lugnegard et al., 2011). Hence, the continuous development of feasible and effective treatment options that address psychiatric symptoms, stress, and quality of life in adults diagnosed with ASD is of paramount importance.

There is no efficacious pharmacological treatment of the core symptoms in ASD (Cheng, Rho, & Masino, 2017; Jobski, Hofer, Hoffmann, & Bachmann, 2017). Many individuals diagnosed with ASD cannot tolerate or have limited effect from pharmacological treatments of co-occurring psychiatric symptoms, such as depression and anxiety (LeClerc & Easley, 2015; K. Williams, Brignell, Randall, Silove, & Hazell, 2013). The research base on feasible and effective psychological interventions in autistic adults that address stress and comorbid

psychiatric symptoms is limited. The most evaluated psychological treatments for comorbid psychiatric symptoms are based on cognitive-behavioral therapy (CBT) (Spain, Sin, Chalder, Murphy, & Happe, 2015), and more recently mindfulness procedures, such as mindfulness-based stress reduction (MBSR) (Cachia, Anderson, & Moore, 2016; Sizoo & Kuiper, 2017). In contemporary psychology, mindfulness defines as non-judgmental and non-reactive attention to experiences occurring in the present moment, including bodily sensations, cognitions, emotions, and urges (Kabat-Zinn, 2005). In ASD, emotional reactions, such as anger or worries, are frequently observed in response to exposure to stressful situations and everyday hassles (Bishop-Fitzpatrick, Mazefsky, & Eack, 2017). Mindfulness is an emotion regulation technique that enhances the ability to cope with emotional responses (Guendelman, Medeiros, & Rampes, 2017). Reviews and meta-analyses support the efficacy of both CBT and mindfulness training in reducing symptoms of anxiety and depression in autistic adults (Sizoo & Kuiper, 2017). A study by Weiss and Lunskey (2010), found that a group-based CBT protocol reduced symptoms of anxiety and depression in adults diagnosed with ASD. The authors concluded that a group format could be a well-suited, supportive, and cost-efficient treatment option (Weiss & Lunskey, 2010). However, researchers report general limitations in the application of CBT in autistic adults, such as difficulties learning to dispute irrational and maladaptive thoughts (i.e., cognitive restructuring), generalization of training of cognitive behavioral techniques to everyday situations, and limited long-term effects (Cardaciotto & Herbert, 2004; Weiss & Lunskey, 2010). Regarding mindfulness-based interventions, an ASD adapted protocol of MBSR was shown to reduce symptoms of depression, negative affect, and rumination in autistic adults (Spek, van Ham, & Nyklicek, 2013). In another study, MBSR reduced symptoms of anxiety, depression, agoraphobia, somatization, inadequacy in thinking and eating, distrust and interpersonal sensitivity, sleeping problems, and rumination, as well as increased general

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psychological and physical well-being (Kiep, Spek, & Hoeben, 2015). However, these protocols (Kiep et al., 2015; Spek et al., 2013) include mindfulness training, but not direct behavioral change processes (Sizoo & Kuiper, 2017). According to the National Institute for Health and Care Excellence (NICE) treatment guidelines, interventions that address co-occurring psychiatric symptoms should use: a concrete and structured approach, include behavioral change components (i.e., to plan and execute goal-directed behaviors), and contain written and visual information (i.e., worksheets and images), to support skills development and facilitate the enhancement of emotional literacy (NICE, 2012). Hence, a treatment method that includes both mindfulness procedures, and behavioral change techniques, and is adjusted to ASD specific needs, would potentially be beneficial to autistic individuals who suffer from stress, psychiatric symptoms and reduced quality of life.

Acceptance and commitment therapy (ACT) is a contextual behavioral approach that combines behavioral change techniques and mindfulness procedures. The goal of ACT is to increase *psychological flexibility*, which refers to the ability to non-judgmentally experience obstructive thoughts, emotions, and body sensations and act effectively upon situational demands according to personally chosen goals and values (Hayes, 2016). ACT suggests that *experiential avoidance* (i.e., *psychological inflexibility*) is one of the roots to behavioral challenges and refers to human beings' tendencies to avoid not only dangerous situations or events but also thoughts and feelings associated with these events (Hayes & Wilson, 1994). In ACT, psychological flexibility increases mainly through two sets of procedures: mindfulness and acceptance skills training, and behavior change techniques. Mindfulness and acceptance skills aim at helping the individual to cope with stressful thoughts, feelings, and body sensations, thereby disrupting experiential avoidance patterns. Behavior change techniques aim at assisting the individual in defining important life directions and act according to them. ACT has proven effective for reducing psychological distress in complex and persistent conditions, such as chronic pain, epilepsy, and psychosis (Hughes, Clark, Colclough, Dale, & McMillan, 2017; Lundgren, Dahl, Yardi, & Melin, 2008; Shawyer et al., 2017). Moreover, ACT has shown to be useful for reducing co-occurring psychiatric symptoms, such as anxiety, depression, and stress, as well as increasing quality of life (A-Tjak et al., 2015).

In both autistic children and adults, psychological inflexibility is a common problem associated with reduced goal-directed action control, vulnerability to stress and sensory stimuli (e.g., sounds, smell or tactile stressors), and adverse life events (Alvares, Balleine, Whittle, & Guastella, 2016). Further, *cognitive fusion* (i.e., difficulties with self-perception and perspective taking on one's mind) is a significant concern, which may additionally narrow their behavior repertoire (Lombardo & Baron-Cohen, 2011; Williams, 2010; Williams & Happe, 2010). There is some support for ACT to have health benefits in adolescents with diagnosed ASD (Pahnke, Lundgren, Hursti, & Hirvikoski, 2014). A study in a special school setting evaluated ACT in 28 students diagnosed with ASD, using a quasi-experimental design (Pahnke et al., 2014). The results showed good feasibility, significantly reduced stress and co-occurring psychiatric symptoms, as well as increased pro-social behaviors. ACT may be a feasible and effective approach for reducing stress and psychiatric symptoms, as well as increasing psychological flexibility and quality of life, in autistic adults. However, to the best of the authors' knowledge, there are no studies evaluating ACT in adults diagnosed with ASD.

1.1. Study objectives

The current pilot study aimed to evaluate the preliminary feasibility and potential utility of an ACT group protocol for adults diagnosed with ASD, in a psychiatric outpatient setting. The research questions were: 1) Is an ACT protocol acceptable for adults diagnosed with ASD? 2) What are the preliminary effects on comorbid symptoms of stress and quality

of life? 3) What are the preliminary effects on symptoms of depression and anxiety, and functional impairment? 4) What are the preliminary effects on ACT consistent processes such as psychological inflexibility and cognitive fusion?

2. Methods

2.1. Design

The design of the study was an open trial with assessments conducted at pre-treatment (T1), post-treatment (T2), and three months after treatment completion (T3).

2.2. Ethics

The regional ethical review board of Stockholm, Sweden approved the study (2012/158-31). The study was performed in accordance with the Declaration of Helsinki (General Assembly of the World Medical, 2014). All participants provided written informed consent.

2.3. Participants

This pilot study was conducted at the Neuropsychiatric Unit Karolinska, at the Psychiatry Northwest clinic, Stockholm City Council, Stockholm, Sweden; a unit specialized in the assessment and treatment of neurodevelopmental disorders in adults. Ten individuals that had undergone a diagnostic evaluation at the unit during the past ten years, and met the inclusion as well as did not meet the exclusion criteria, were eligible to participate in the study. If changes in the participants' pharmacological medication would occur, they could continue treatment but be excluded from statistical analyses. The responsibility for the participants' pharmacological treatment stayed with their attending psychiatrist. The included participants reported no changes in medication during the study period. The inclusion criteria were: (a) a DSM-IV (APA, 2000) diagnosis of Asperger syndrome (corresponds to a diagnosis of ASD without specified intellectual disability and language impairment in the fifth edition of the DSM; APA, 2013) as the primary neurodevelopmental diagnosis; (b) 18 years or older; and (c) if on any psychoactive drug treatment (for ADHD or other diagnoses), the treatment should have been stable for at least three months. The exclusion criteria were: (a) ongoing substance abuse (during the last 3 months); (b) diagnosed intellectual disability (intelligence quotient [IQ] < 70); (c) organic brain injury; (d) suicidality; and (e) all clinically unstable psychosocial circumstances or comorbid psychiatric disorders that were of such a severity that participation was deemed impossible, such as being homeless, or having severe depression, psychosis, or bipolar disorder not under stable pharmacological treatment. An explicit goal of the study was to include a representative selection of psychiatric patients with ASD. Hence, comorbid neurodevelopmental disorders, such as ADHD or Tourette's disorder, were not excluded.

Participants were five women and five men ranging in age from 25 to 65 years with a mean age of 49 years (SD = 12). The mean IQ measured with the Wechsler Adult Intelligence Scale-revised edition (WAIS-R) (Wechsler, 1981) or WAIS third edition (WAIS-III) (Wechsler, 1997) was 106 (SD = 16.14). Five participants had an educational level corresponding to college or university, two participants upper secondary, and three participants nine years of compulsory school or less. A description in detail of the sample shows in Tables 1 and 2.

2.4. Procedure

The diagnostic assessment of all study participants was performed at the Neuropsychiatric Unit Karolinska, at the Psychiatry Northwest clinic, Stockholm City Council, Stockholm, Sweden. The diagnostic evaluation followed local clinical guidelines (X) and was based on multiple sources of information. A clinical interview by a psychiatrist

Table 1
Demographic characteristics of the participants (n = 10).

Occupation	n	Relationship	n	Housing	n	Social network	n
Sick leave	5	Single	7	Single household	6	Friends > 1 t/month	6
Daily activities	2	Divorced	3	With children	2	Friends > 1 t/week	2
Full time work	1	Children	3	With parents	1	No friends	2
Part time	1			Special accommodation	1		
Full time pension	1						

Note. t = number of occasions.

Table 2
Clinical characteristics of the participants (n = 10).

Comorbidity	n	On-going	n	NDD	n	On-going pharmacotherapy	n
Lifetime							
Dysthymia	1	Dysthymia	1	ADHD	5	SSRIs	3
Depression	1	Depression	4	Tourette's syndrome	1	Anti-epileptics	2
Panic disorder	2	GAD	2			Methylphenidates	3
GAD	1	OCD	1			Sleep medication	1
OCD	1						
Social phobia	1						
Epilepsy	1						
PD-NOS	1						

Note. GAD: generalized anxiety disorder; OCD: obsessive-compulsive disorder; PD-NOS: personality disorder not otherwise specified; NDD: neurodevelopmental disorder; ADHD: attention deficit/hyperactivity disorder; SSRIs: selective serotonin reuptake inhibitors.

was included, as well as neuropsychological testing with WAIS-R (Wechsler, 1981) or WAIS-III (Wechsler, 1997), Conner's Continuous Performance Test (CPT-II) (Conners, 2000) and/or Delis-Kaplan Executive Function System (D-KEFS) (Delis, Kaplan, & Kramer, 2001) by a psychologist. The participants completed standardized self-rating questionnaires, such as the Adult Autism Spectrum Quotient (AQ) (Baron-Cohen, Wheelwright, Skinner, Martin, & Clubley, 2001) and Wender Utah Rating Scale (WURS) (Ward, Wender, & Reimherr, 1993), for the assessment of autistic symptoms and childhood ADHD-symptoms. Further information was gathered by interviewing the participants' family members or significant others to obtain a complete medical history of each participant. When available, additional information was obtained from records of child and adolescent psychiatry, school health services, and adult psychiatry. The demographic and clinical information was obtained from the participants' medical records and self-reports. The participants completed a questionnaire, covering demographic information and current stressors within different areas of life activities (Hirvikoski, Lindholm, Nordenstrom, Nordstrom, & Lajic, 2009). The two group leaders administered self-report questionnaires to examine the feasibility and outcomes of the stress management program. The group leaders were a clinical psychologist and Ph.D. candidate (J.P), with extensive experience of working with patients with ASD, and a graduate student in clinical psychology. During the

completion of the self-report questionnaires, the participants were encouraged to ask the group leaders for help when necessary. When completed, the questionnaires were checked whether all items were filled in correctly to prevent any missing values.

2.5. Intervention

The manualized ACT group program named *NeuroACT – stress management for flexibility and health*, which was used in this study was a modified version of the ACT protocol previously evaluated in adolescents and young adults diagnosed with ASD (Pahnke et al., 2014). The NeuroACT treatment manual can be retrieved from the website <http://www.brainproof.se> or will be made available upon request by contacting the first author. The treatment program combines a functional contextual perspective with neuropsychology and support of executive functions. The intervention consisted of 12 weekly 150 min' group sessions. After each session, there were 30 min where the participants could ask questions or get help with homework assignments. Each session had a similar format with a short mindfulness or acceptance exercise, followed by a review of homework assignments, introduction of the theme of the particular session, and finally a review of new homework assignments and session evaluation. In-session activities and homework assignments consisted of pencil-and-paper exercises using adapted work-sheets (i.e., recording of stressful situations and avoidance behaviors, values and actions work, cognitive defusion exercises, visualized metaphors, and home-assignment sheets), alongside mindfulness training on a weekly basis using a compact disc (CD) with short adapted mindfulness and acceptance exercises. Auditive instructions and explanations were provided on the CD for how to perform the exercises, and the essentials of mindfulness and acceptance. Prior to each exercise, a rationale for why to practice mindfulness and acceptance was provided on the CD. The central components and processes of each treatment session were explained using PowerPoint images. Psychoeducative information sheets were given on stress, restoration, emotions, and perception. The modifications made from the protocol used for adolescents and young adults with ASD were: 1) adaptation of examples in order to be recognizable to adults, 2) clarification of homework assignments and individual support on a voluntary basis from the group leaders during 30 min after each treatment session, 3) extended psychoeducative material in order to help the participants obtain knowledge of the treatment themes, and 4) color-coded worksheets in order to

Table 3
NeuroACT treatment modules and sessions.

<p>Module 1. Stress and avoidance (Session 1–2)</p> <ul style="list-style-type: none"> ● Psychoeducation on stress from an ACT-perspective. ● Recording of stressful situations. ● Avoidance trap. <p>Module 3. Values and committed action (Session 5–6)</p> <ul style="list-style-type: none"> ● Values- and motivation work. ● Purpose and meaning. ● Behavior goals and committed action. <p>Module 5. Integration of ACT (Session 9–10)</p> <ul style="list-style-type: none"> ● Using presence, defusion, and acceptance. ● Managing stress in social situations. ● Restorative actions. 	<p>Module 2. Perspective taking (Session 3–4)</p> <ul style="list-style-type: none"> ● Introduction to mindfulness and cognitive defusion. ● Being present. ● Perspective taking skills. <p>Module 4. Acceptance and compassion (Session 7–8)</p> <ul style="list-style-type: none"> ● Acceptance and compassion skills. ● Acceptance of emotions and body sensations. ● Acceptance of sensory input. <p>Module 6. Consolidation of ACT (Session 11–12)</p> <ul style="list-style-type: none"> ● Action plan. ● Review of group experiences. ● Planning for the future.
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facilitate and provide more structure for the participants. The central treatment components and aims are described in more detail in Table 3.

2.6. Measures

2.6.1. Treatment credibility

Treatment credibility was assessed using an ASD-adapted version of the Treatment Credibility Scale (TSC) (Borkovec & Nau, 1972). The TSC consists of five items scored on a scale from 1 to 10 with a higher score indicating more credibility of the current treatment. The items were adjusted to be relevant for autistic individuals: 1) how apprehensible the treatment seemed to the participants; 2) how confident they felt that the group would reduce their ASD-related problems; 3) how confident they would be in recommending this kind of group to a friend with ASD; 4) how successful the participants thought that the treatment would be for other diagnoses; and 5) how much improved they expected to become with this treatment. The TCS total score is calculated as a mean of all items, and each item is calculated as a mean. The TCS has demonstrated high internal consistency in a Swedish sample with Cronbach's alpha (α) = 0.83 (Alfonsson, Olsson, & Hursti, 2016). The TCS was administered at the end of the treatment.

2.6.2. Intellectual ability

IQ was assessed with the WAIS-R (Wechsler, 1981) or the WAIS-III (Wechsler, 1997). The WAIS is the most frequently used instrument for assessment of intellectual ability in adults (16–89 years). WAIS-R (Wechsler, 1981) consists of six verbal and five performance subtests. The verbal tests are Information, Comprehension, Arithmetic, Digit Span, Similarities, and Vocabulary. The performance tests are Picture Arrangement, Picture Completion, Block Design, Object Assembly, and Digit Symbol. A verbal IQ, performance IQ, and full-scale IQ are obtained. WAIS-III (Wechsler, 1997) consists of fourteen subtests and 4 secondary indexes; Verbal Comprehension (Vocabulary, Similarities, Information, Comprehension), Perceptual Organization (Picture Completion, Block Design, Matrix Reasoning), Working Memory (Arithmetic, Digit Span, Letter-Number Sequencing), and Processing Speed (Digit Symbol-Coding, Symbol Search). The subtests of Picture Arrangement and Object Assembly are not included in the indexes. A full-scale IQ is obtained as well as an IQ for each index. The IQ and the index scores have a population mean of 100 and a standard deviation of 15, and subtest results have a mean of 10 and standard deviation of three. The WAIS has high consistency, and test-retest-reliability ranges between 0.70 and 0.90 (Wechsler, 1981). Inter-scoring coefficients have shown to be high (0.90) (Wechsler, 1981). The WAIS correlates highly with the Stanford-Binet IV test (0.88) (Wechsler, 1981).

2.6.3. Psychiatric comorbidity

Co-occurring psychiatric disorders were assessed with the Mini-International Neuropsychiatric Interview (MINI) (Sheehan et al., 1998). The MINI is a structured diagnostic interview for DSM and ICD psychiatric disorders. The MINI has shown moderate agreement with clinical mood and anxiety disorders (Verhoeven et al., 2017). For mood disorders, the AUC (i.e., area under the ROC curve) has shown a range between 0.55 and 0.81 (median 0.73), and for anxiety disorders, the AUC has been ranged between 0.78 and 0.88 (median 0.83) (Verhoeven et al., 2017).

2.6.4. Perceived stress

The participants' subjective stress, was assessed using the Perceived Stress Scale 14 items (PSS-14) (Cohen, Kamarck, & Mermelstein, 1983). The PSS is a widely used instrument for measuring the degree to which situations in one's life are appraised as stressful. The items are rated on a five-point Likert-type scale (0 = never to 4 = very often). A total score is calculated after reversing positive items' scores and then summing up all scores. A higher score indicates greater stress. The PSS has shown good construct validity with anxiety ($r = 0.68$), depression

($r = 0.57$), and mental or physical exhaustion ($r = 0.71$) in a Swedish sample (Nordin & Nordin, 2013). The PSS-14 has demonstrated high internal consistency in a Swedish sample with Cronbach's $\alpha = 0.84$ – 0.90 (Eklund, Backstrom, & Tuveesson, 2014).

2.6.5. Quality of life

Self-perceived quality of life was assessed using the Satisfaction with Life Scale (SWLS) (Diener, Emmons, Larsen, & Griffin, 1985). The scale consists of five items rated on a Likert-type scale 1–7, with a higher score indicating a higher quality of life. The total score is calculated as the sum of the item scores. Satisfactory convergent validity with social support has been observed ($r = 0.39$) for SWLS and Oslo Social Support Scale (Glaesmer, Grande, Braehler, & Roth, 2011). Internal consistency of the SWLS has been reported as high (Cronbach's $\alpha = 0.88$) in a Swedish sample (Hultell & Gustavsson, 2008), which is in accordance with previous findings from other countries (Arrindell, Heesink, & Feij, 1999; Diener et al., 1985; Navratil & Lewis, 2006).

2.6.6. Depression

Depressive symptoms were assessed using the Beck Depression Inventory-II (BDI-II) (Beck, Ward, Mendelson, Mock, & Erbaugh, 1961), a 21-item self-report questionnaire designed for adolescents and adults that measures depressive symptoms on a 0–3 scale, with a higher score indicating more depressive symptoms. The total score is calculated as the sum of the scores on each item. Good convergent validity has been observed ($r = 0.72$) for the BDI and Montgomery Asberg Depression Rating Scale (Lahlou-Laforet, Ledru, Niarra, Consoli, & Investigators, 2015). The BDI demonstrates high internal consistency (Cronbach's $\alpha = 0.89$) in a Swedish sample (Kjaergaard, Arfwedson Wang, Waterloo, & Jorde, 2014).

2.6.7. Anxiety

Anxiety symptoms were assessed using the Beck Anxiety Inventory (BAI) (Beck, Epstein, Brown, & Steer, 1988), a 21-item self-report questionnaire measuring anxiety symptoms on a 0–3 scale, where a higher score indicates more anxiety symptoms. The total score is calculated as the sum of the scores on each item. Satisfactory AUC statistics have been reported (78.5%) for the BAI (Phan et al., 2016). Both internal consistency (Cronbach's $\alpha = 0.91$) and test-retest-reliability ($r = 0.84$) of the BAI have been reported as high (Vazquez Morejon, Vazquez-Morejon Jimenez, & Zanin, 2014).

2.6.8. Functional impairment

The subjective appraisal of functional impairment as related to familial, social, and vocational aspects of life was assessed using the Sheehan Disability Scale (SDS) (Sheehan, Harnett-Sheehan, & Raj, 1996). The scale is a three-item, self-rated questionnaire designed to measure the extent to which a patient's disability due to an illness or health problem interferes with work/school, social life/leisure activities, and family life/home responsibilities, ranging from 0 (*not at all*) to 10 (*extremely*). Each subscale can be scored independently or combined into a single total score, representing a global impairment rating, ranging from 0 to 30, with higher scores indicative of significant functional impairment. Satisfactory AUC statistics have been reported (81.4%) for the SDS (Luciano et al., 2010). The scale demonstrates high internal consistency with Cronbach's $\alpha = 0.89$ (Leon, Olfson, Portera, Farber, & Sheehan, 1997).

2.6.9. Psychological inflexibility

Psychological inflexibility defines as the inability to experience obstructive thoughts, emotions, and body sensations non-judgmentally, and act effectively upon situational demands according to personally chosen goals (Hayes, Luoma, Bond, Masuda, & Lillis, 2006a). Psychological inflexibility was assessed using the Acceptance and Action Questionnaire 7 items (AAQ-7) (Hayes, Luoma, Bond, Masuda, & Lillis, 2006b). The scale consists of 7 items, which are rated on a Likert-type

scale from 1 to 7. A higher score indicates more psychological inflexibility. The convergent validity ($r = 0.63$) and internal consistency (Cronbach's $\alpha = 0.89$) of the AAQ, have been reported as satisfactory (Bond et al., 2011), and was evaluated in a Swedish sample (Lundgren & Parling, 2017).

2.6.10. Cognitive fusion

Cognitive fusion refers to the inability to take perspective on one's thoughts without letting their content guide one's actions (Masuda, Hayes, Sackett, & Twohig, 2004). Cognitive fusion was assessed using the Cognitive Fusion Questionnaire 7 items (CFQ-7) (Gillanders et al., 2014). The CFQ-7 is a 7-item Likert-type scale from 1 to 7 that measures general cognitive fusion. Higher scores reflect more cognitive fusion. The discriminative validity ($r = -0.78$) of the CFQ, concerning psychological acceptance, has been observed as satisfactory in a clinical sample (McCracken, DaSilva, Skillicorn, & Doherty, 2014). The scale demonstrates high internal consistency with Cronbach's $\alpha = 0.93$ (Ruiz, Suarez-Falcon, Riano-Hernandez, & Gillanders, 2017).

2.7. Data analysis

Analyses were on an intention-to-treat basis. Data analyses included the full sample of 10 patients who attended at least one treatment session. When post-treatment data were missing, data were carried forward from the last assessment completed. All but one participant completed post- and follow-up assessments. Analyses were conducted using the SPSS version 21.0 and, after controlling that the sample scores were normally distributed, paired samples t -tests were performed to examine whether there were any changes on the measures from pre-to post-treatment and from pre-treatment to 3-month follow-up. Effect sizes were calculated using Cohen's d (Cohen et al., 1983). Cohen's d effect sizes are commonly interpreted as 0.2 (small), 0.5 (medium), and 0.8 (large).

3. Results

3.1. Feasibility

Nine out of ten completed the treatment and among them mean attendance was 11 sessions ($SD = 3$, range 9–12). One of the participants dropped out after two sessions. The treatment credibility score was rated as high ($M = 7.7$, $SD = 0.8$) using the TCS (Borkovec & Nau, 1972). The mean score was 8.3 ($SD = 1.6$) on item 1 (how apprehensible the treatment seemed to the participants); 6.9 ($SD = 1.6$) on item 2 (how confident they felt that the group would reduce their ASD related problems); 8.3 ($SD = 1.2$) on item 3 (how confident they would be in recommending this kind of group to a friend with ASD); 8.0 ($SD = 0.7$) on item 4 (how successful the participants thought that the treatment would be for other diagnoses); and 6.7 ($SD = 2.5$) on item 5 (how much improved they expected to become with this treatment). Overall, the participants were successful in completing homework assignments, as well as carrying out mindfulness and exercises at home.

3.2. Outcome measures

As shown in detail in Table 4, the results showed a statistically significant change in several measures at post-assessment as compared to pre-assessment. The sample data met the statistical assumptions for using paired samples t -test (Xu et al., 2017). Measures of perceived stress (Fig. 1), social impairment, psychological inflexibility, and cognitive fusion significantly reduced from pre- (T1) to post-treatment (T2). At the 3-month follow-up (T3) there was a significant increase in quality of life (Fig. 1) and a significant reduction in depressive symptoms, as compared to T1. Measures of social disability and cognitive

fusion were still significantly reduced at T3 as compared to T1. The results did not show any significant changes in symptoms of anxiety, or work- and family-related impairments.

4. Discussion

The current pilot study aimed at examining the preliminary feasibility and efficacy of ACT for adults with ASD in a psychiatric outpatient setting. Outcome measures of stress, quality of life, comorbid symptoms such as anxiety and depression, level of functioning (social, family and vocational), as well as ACT consistent measures of psychological inflexibility and cognitive fusion, were evaluated. The participants perceived the NeuroACT program as credible, and session completion, homework compliance, and attendance were high. Overall, the results showed a statistically significant change in several measures. Improvements were observed for perceived stress and quality of life, as well as for depressive symptoms, social impairment, psychological inflexibility, and cognitive fusion. However, no significant improvements were found for symptoms of anxiety, or work- and family-related impairments. Where significant changes were found, effect sizes ranged from small to large. The largest effect size was found for perceived stress and psychological inflexibility at post-assessment, and the quality of life at the follow-up. Overall, the results indicated that the NeuroACT program is a promising treatment for adults with ASD and that further research, using a methodologically robust randomized controlled design, is warranted.

To our knowledge, this is the first study to indicate that adults diagnosed with ASD could benefit from ACT. The finding is consistent with previous studies on mindfulness training, which suggest that such practice improves wellbeing in adults diagnosed with ASD (Conner & White, 2017; Kiep et al., 2015; Spek et al., 2013). ACT for autistic individuals relies heavily on mindfulness training from a functional analytic perspective (i.e., using mindfulness skills to pursue personal goals and values). Moreover, the NeuroACT program is structured and adds other treatment modules of value-based work, cognitive defusion, acceptance skills, and psychoeducation, with the overarching goal of creating psychological flexibility (Villatte et al., 2016). Increasing psychological flexibility may be especially crucial in autistic individuals, since short-term reinforced behaviors and cognitive inflexibility, along with experiential and social avoidance, is a common problem (Bishop-Fitzpatrick, Mazefsky, Minshew, & Eack, 2015). In this study, while perceived stress significantly decreased immediately after treatment, this change was no longer significant at the follow-up. However, the opposite was found for quality of life, where significant improvement was found at the follow-up but not directly after treatment. This finding may indicate a broadening of the participants' behavioral repertoire and a decrease in social avoidance, giving rise to increased symptoms of stress *but at the same time* enhancing the participants' sense of meaning and purpose in everyday life. In ACT, behavioral problems are seen as how the individual *relates* to his or her symptoms, and not the symptoms in themselves (Gaudiano, Herbert, & Hayes, 2010). Symptoms of stress are associated with high arousal and unpleasant affect, which increases *the risk of* emotional and behavioral avoidance (Sheynin et al., 2017). From an ACT perspective, when patients learn to relate to symptoms of stress more flexibly, the risk of avoidance decreases (Hayes et al., 2006b).

Moreover, social functioning improved immediately after treatment and sustained at follow-up, suggesting a reduction in social avoidance and increased social functioning. These findings are consistent with studies on ACT suggesting an 'incubation effect,' whereby improvement is maintained or increased after ACT ceases (Clarke, Kingston, James, Bolderston, & Remington, 2014; Hayes et al., 2004; Lundgren, Dahl, Melin, & Kies, 2006). Although recent data challenge the psychometric validity of conventional measures of experiential avoidance (Rocheftor,

Table 4

Means and standard deviations on study measures at pre, post and follow-up (n = 10). Paired samples t-tests based on intention to treat to evaluate differences between assessment points, and effect sizes as Cohen's d.

Measure	Pre treatment	Post treatment	3-month follow-up	Cohen's d				
	M (SD)	M (SD)	M (SD)	t	Pre-post	Pre-follow-up	Pre-post	Pre-follow-up
PSS	35.1 (5.4)	29.0 (7.7)	31.5 (8.3)	2.73*	1.20	0.92	0.92	0.51
SWLS	13.2 (5.1)	15.5 (5.7)	17.0 (4.8)	-1.54	-2.79*	0.43	0.43	0.77
BDI-II	21.6 (14.3)	15.3 (10.7)	14.4 (11.6)	2.00	2.45*	0.50	0.50	0.55
BAI	24.2 (16.4)	14.5 (9.5)	18.4 (11.0)	1.56	1.14	0.72	0.72	0.42
SDS (work)	6.7 (2.8)	7.1 (1.7)	6.2 (2.5)	-.51	.75	0.17	0.17	0.19
SDS (social)	7.6 (3.0)	6.2 (3.2)	6.8 (2.9)	2.69*	2.45*	0.45	0.45	0.27
SDS (family)	6.6 (2.0)	5.9 (2.0)	6.3 (2.1)	.96	.64	0.35	0.35	0.15
AAQ-7	31.7 (8.1)	26.3 (4.2)	27.7 (6.0)	2.68*	1.50	0.84	0.84	0.56
CFQ-7	33.0 (6.1)	28.4 (7.4)	29.9 (5.3)	3.82**	3.09*	0.68	0.68	0.54

Note. PSS = Perceived Stress Scale; SWLS = Satisfaction with Life Scale; BDI-II = Beck Depression Inventory-II; BAI = Beck Anxiety Inventory; SDS = Sheehan Disability Scale; AAQ-7 = Acceptance and Action Questionnaire – 7 items; CFQ-7 = Cognitive Fusion Questionnaire – 7 items.

*p < .05.

**p < .01.

Baldwin, & Chmielewski, 2018), improvements in the ACT consistent measures regarding psychological flexibility and cognitive fusion may further indicate that the participants' ability to cope with thoughts, emotions, and body sensations has increased. Alternatively, to paraphrase one of the participants: 'I didn't know I had thoughts.' In summary, these findings may suggest that the participants have benefited from the NeuroACT program in line with the ACT model. However, further studies are needed to evaluate the potential benefits of ACT for autistic adults more fully.

Overall, the results of the current study indicate that adults diagnosed with ASD can benefit from a structured and modified ACT program. Although promising, due to the pilot open trial design the present study has several limitations regarding the efficacy evaluation. First, the results showed significantly reduced symptoms of depression but not anxiety, although anxiety symptoms reduced with a medium effect size from pre to post-assessment. With regards to symptoms of anxiety, as with the other non-significant results, there may be a risk of a type-2 error because of the small sample size. Moreover, there might be a risk of type-1 error regarding the statistically significant measures. However, since several results are pointing in the same direction, there is a minor probability of this. Second, as no control group was used, time or other confounding variables could explain the treatment effects. Third, the outcome measures relied on self-report of the participants and no independent and objective criteria were used, which could imply over- or underestimation of individual progress. Fourth, the participants included in the study all had normal to above average

intellectual capacity, why generalization of the results to autistic adults with lower intellectual capacity cannot be made. Fifth, no measurements of autistic symptoms were performed; as such, no information was provided on whether the NeuroACT program could be beneficial on autistic core difficulties.

For future research, to increase the internal validity and generalizability of the results, studies with a randomized controlled design using blinded assessments and control of treatment adherence are needed to further explore the potential benefits of ACT in adults diagnosed with ASD. Evaluation of the effect of potential mediators and moderators of change is warranted, such as gender, cognitive abilities, adherence to homework, and ACT processes on treatment outcomes. Further, an evaluation of the potential effects of ACT on autistic core difficulties would be of interest. Finally, a possible speculative correlation between social and behavioral avoidance and quality of life and depression would need to be evaluated.

In summary, the results of the current pilot study suggest that the NeuroACT program may be a promising treatment, which is feasible and tolerable in a psychiatric outpatient setting, and has the potential to be effective for improving stress, quality of life, social functioning, cognitive fusion, psychological inflexibility, and symptoms of depression, in adults diagnosed with ASD.

Conflicts of interest

There are no conflicts of interest to disclose.

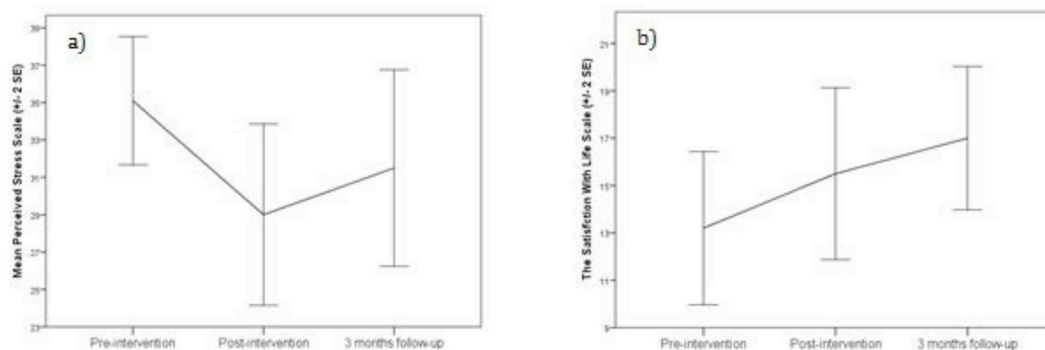


Fig. 1. The perceived stress scale (PSS) showed a significant reduction from pre to post intervention (p = .023) but not from pre to 3-month follow-up (a). The satisfaction with life scale (SWLS) showed a significant increase from pre to 3-month follow-up (p = .021) but not from pre to post (b). SE: standard error.

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