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Anna Pyszkowska[1], Małgorzata Ewa Górnik-Durose[1]

[1] *University of Silesia, Katowice, Poland*

Corresponding author: Anna Pyszkowska, anna.pyszkowska@us.edu.pl

Effectiveness of on-line and off-line Acceptance and Commitment Therapy in developing psychological flexibility, self-compassion and ego-resiliency in parents of children with autism spectrum disorder

Abstract: The aim of this study was to investigate the effectiveness of Acceptance and Commitment Therapy (ACT) among parents of children with autism spectrum disorder (ASD) through reducing psychopathology, improving quality of life, and developing psychological skills (psychological flexibility, self-compassion, and ego-resiliency). The study was quasi-experimental in the form of a four-week ACT intervention; three measurements were obtained (baseline, one week after training, one month after training). It involved 60 participants divided into three groups: two criteria groups (ACT in the off-line form, N=20, ACT in the on-line form, N=20), and one control group (N=20). The results showed a significant improvement in the area of quality of life and the level of psychological skills among parents participating in the ACT training, and this improvement was maintained both a week and a month after the end of the training. The form of participation in the training did not differentiate the groups, which may indicate their equivalence. In addition, significant intergroup differences were shown between participants from the criterion groups and those from the control group, as the subjects who did not participate in the training were characterized by lower quality of life and lower level of psychological skills, and higher intensity of psychopathological symptoms. The results can be used both in designing further scientific research and in clinical practice, especially in the psychological care of families of persons diagnosed with ASD, with special focus on the area of developing psychological skills and the use of short-term therapeutic methods.

Keywords: *autism, acceptance and commitment therapy, self-compassion, ego-resiliency, quality of life*

INTRODUCTION

Autism spectrum disorder (ASD) diagnosis might have, at least, few consequences for a parent. On the one hand, it is associated with extreme emotions (from relief to despair); on the other – autism's irrevocability requires reevaluating both the parent's and the family's life, self-expectations as a parent, in addition to introducing and accepting vital changes in everyday, professional and social life (Myers et al., 2009). Despite qualitative interviews that depict parenting a child with ASD as rewarding, life- and perspective-changing, and full of love and commitment (Szmania, 2014; Myers et al., 2009), vast research shows that parents of children with ASD often suffer from depression, anxiety, stress (Bitsika et al., 2013), burnout, social exclusion (Arellano et al., 2017), self-blame (Čolić et al., 2019; Brei et al., 2015) or self-stigma (Wong et al., 2016). Anticipatory fear of the child's future, burnout and loving relationship are two sides of the same coin, which makes parenting a child with ASD a multifaceted experience that may be associated with a self-criticizing vicious circle mechanism linked with a sense of being a "not good enough parent" (Čolić et al., 2019).

Previous research showed that an effective method for enhancing the quality of life of parents with children with ASD is Acceptance and Commitment Therapy (ACT) (Blackledge & Hayes, 2006; Poddar et al., 2015). It is

classified as the third wave of the cognitive-behavioral therapy approach focused on developing psychological flexibility defined as a non-judgmental approach to one's thoughts and feelings, concentrated on enhancing committed actions based on one's values (Chin & Hayes, 2017). As ACT derives from contextual-behavioral science, it is oriented on developing abilities in the area of flexible adaptation to the environment, with a significant focus on environmental contexts and functions in one's perspectives (Chin & Hayes, 2017). An antonym of psychological flexibility is psychological rigidity that is considered the main source of human suffering (Hayes et al., 1999). Psychological flexibility consists of six processes: acceptance, defusion, self-as-context, committed action, values, and mindfulness. Acceptance is defined as the active choice to experience unpleasant thoughts or emotions (private experiences) without denying them or changing them as they are temporary and come and go. It focuses on one's private experiences hence it encourages one to accept those, while actively committing to change one's environment in order to develop better, more fulfilling life (Harris, 2008). Defusion is described as an ability to consider one's cognitive experience as mere thoughts, not as a commanding reflection of a one true reality, while self-as-context allows considering different roles and needs experienced by a person in various environmental contexts. Values consist of one's meaningful ideas and behaviors, while committed action is actions taken towards fulfilling one's values. Mindfulness is the ability of being conscious of the present moment, (Hayes et al., 1999). ACT is widely reported to be both an effective therapeutic and training method in various clinical and non-clinical contexts (Bai et al., 2020; Hacker et al., 2016; A-Tjak et al., 2015). The latest research shows that iACT – ACT provided on-line – shows effectiveness similar to the stationary form with smaller effect size rates (Thompson et al., 2020).

As mentioned, caring for a child with ASD may be associated with constant anticipatory fear and burnout as autism is not a disease to be cured but a specific and invariable feature of the neurological and psychological functioning of a person (Mandy & Lai, 2016), often associated with the neurodevelopmental disorder in forms of communication impairment, social exclusion or dependence on others in everyday life (Lai et al., 2018). Having that in mind, acceptance and adaptation to the given environment, as well as providing self-care and effective coping, are core needs for caregivers of persons with ASD (Lunksy et al., 2017; Pyszkowska & Wrona, 2021).

Numerous studies indicate the importance of two additional resources in the context of developing psychological flexibility: self-compassion, related to mindful awareness of emotions and self-care (McLean et al., 2018; Neff & Tirch, 2013), and ego-resiliency, focused on active adaptation despite emerging adversities and difficulties (Elliot et al., 2019; Koole et al., 2015). The above-mentioned skills share common features. First, they are activated in times of experiencing difficulties and suffering (Neff, 2003; Bonanno, 2005). Secondly, they share a common personality foundation (Pyszkowska, 2020; Neff & Tirch, 2013) and thus a complementary mechanism of functioning. Additionally, Marshall and Brockman (2016), McLean et al. (2018) and Silberstein et al. (2012) showed significant relationships between psychological flexibility and self-compassion, while Chan et al. (2018) presented a model assuming the interaction of these two variables as protective factors for people experiencing stigma and self-stigma, which is consistent with other results in this area (cf. Huellemann & Calogero, 2020; Heath et al. 2017). Furthermore, there are positive relationships between self-compassion and resilience among people experiencing chronic illness or prolonged stress (Gentili et al., 2019; Mahmoodi, 2018), and self-compassion and psychological flexibility play the role of protective factors in maintaining resilience (Shattell & Johnson, 2018). With that in mind, it is reasonable to consider these three resources as a multi-faceted cognitive-behavioral coping mechanism, operating on the basis of a feedback loop, the overarching goal of which is to improve the functioning and well-being of an individual in a mental crisis.

Lodder et al. (2020) reported that defusion and self-compassion-oriented one-session workshop significantly reduced self-blame, self-stigma, and increased self-compassion and self-esteem among parents of children with ASD. These results are in line with the assumptions that self-compassion and ego-resiliency may be associated with psychological flexibility as some researchers suggest similarities between psychological flexibility and self-compassion in acceptance and self-kindness, while ego-resiliency may resemble committed action and flexibility oriented at adaptation to the environment (Pyszkowska, 2020; Marshall & Brockman, 2016; Neff & Tirch, 2013). Recent research shows that both self-compassion and ego-resiliency can be successfully developed through ACT intervention (Wilson et al., 2018; Ferrari et al., 2019).

The aim of the current study was to examine the effectiveness of acceptance and commitment therapy in parents of children with the autism spectrum disorder in a Polish sample. As ACT is considered as a transdiagnostic approach that is not limited to a singular psychiatric diagnosis (Hayes et al., 1999), but mainly focuses on contextual aspects of one's suffering (Chin & Hayes, 2017), it was decided to carry out an acceptance and commitment therapy-based training for parents of children with ASD who share common experiences and contexts. Also, based on literature analysis, it was hypothesized that this group, although heterogenous, shares similar symptoms of burnout, diminished quality of life, and being at risk of developing psychopathology (e.g. depression, anxiety disorders) (cf. Pyszkowska & Wrona, 2021; Čolić et al., 2019; Bitsika et al., 2013). Due to the COVID-19 outbreak, a four-week training was conducted in on-line or off-line form depending on pandemic restrictions at a given time (summer-autumn 2020). It was hypothesized that ACT interventions would enhance parents' quality of life (Poddar et al., 2015), develop psychological flexibility (Blackledge & Hayes, 2006), self-compassion (Lodder

et al., 2020) and ego-resiliency, and reduce psychological distress (depression, anxiety, and stress) (Corti et al., 2018). We hypothesized that both ACT interventions, i.e., on-line and offline, would enhance parents' quality of life at similar rates (Thompson et al., 2020).

MATERIALS & METHODS

Participants

Participants were recruited through local autism foundations and counseling services based in the region of Upper Silesia, Poland. Invitation regarding ACT training groups included the following information: description of the ACT procedure, time of training, and trainer's information. Inclusion criteria for participants of this study were: 1) having a child aged 3-9 years with a diagnosis of autism spectrum disorder according to DSM-5 (APA, 2013) and no other developmental or psychiatric diagnosis; 2) ASD diagnosis was made minimum one year prior; 3) no other psychological treatment received by a parent at a time or in the past; 4) no psychiatric disorder reported by a parent. The last two points were made to ensure that no other psychological intervention was applied at the time of the training, therefore potential changes in participants' well-being established over the time of the study were due to the ACT training, not other psychological activities (cf. Corti et al., 2018).

Initially, participants were able to participate in the study in two groups: the ACT group and the control group that did not receive any treatment. Due to the COVID-19 pandemic and epidemiological restrictions in Poland that appeared during the time this study was underway, it was decided to split ACT groups into two: off-line and on-line, using the same protocol in both cases. First, 46 parents of children with autism spectrum disorder responded to the advertisement of the recruitment of the study in an off-line setting. 16 persons did not meet inclusion criteria,or did not attend any meeting; 10 persons participated only in the first meeting without further notice. Ultimately, 20 persons took part in full ACT training in the off-line setting (October 2019-February 2020; July-September 2020) and provided all measurements. Then, the recruitment of the on-line group was conducted, and 32 persons responded. 9 did not meet inclusion criteria or did not attend any meeting, 3 persons participated only in first meeting. Overall, 20 persons took part in a full ACT training in the on-line setting via Google Classroom (October 2020-November 2020) and provided all measurements.

An additional group of 20 parents fulfilling the inclusion criteria participated in the study as a control group who did not receive any psychological intervention (October 2020-November 2020). Persons assigned as a control group were parents who declined their need or interest to participate in any psychological intervention. Reasons provided by parents of the control group for not taking part in ACT interventions were, namely: lack of time due to childcare or work commitments, problems with access to the meeting place, or feeling that one does not need any psychological help. All participants of the control group were allowed to take part in one single psychological session after completing the measurements (of which only 2 have actually taken that opportunity).

All participants provided completed questionnaires and provided informed consent.

The summary of sociodemographic characteristics of the sample is presented in Table 1.

Procedure

While being fully aware of the potential difficulties and the methodological consequences of this decision, participants in this study were not randomly assigned to the criteria or control groups. This decision was made after careful consideration that due to the lack of systemic psychological support dedicated to parents of children with ASD in Poland (Płatos, 2016) and the demanding research procedure, it would be unethical to randomly select participants to any of the groups (cf. Corti et al., 2018). It was found ethically unjustified and potentially socially harmful to assign a priori people hypothetically in need of such support to the control group (cf. Szmania, 2014). Although persons who were assigned to a control group were not motivated to participate in the ACT training, they were eager to complete baseline and follow-up measurement as they reported being engaged and motivated in developing better understanding of parents of children with ASD in Poland which is in line with previous reports regarding social commitment of this group in various areas (Płatos, 2016). This specific approach was also applied in a study by Corti et al. (2018) in order to show differences between persons who have participated in the ACT training *vs.* those who did not, and to establish whether it was the ACT training that was significant for developing (or reducing) symptoms in questions. Therefore, it was decided to use it as a model in conducting a study in the Polish sample. Of note, persons from a control group were sharing core characteristics with a criteria group, such as: being a parent of a child with ASD diagnosis and not receiving any other psychotherapeutic or psychological help; also, a further comparison showed that the three groups studied – one control and two criteria groups – at the time of the baseline measurement did not differ in terms of variables studied.

Eligible and interested participants completed a consent form and baseline questionnaire in the week prior to attending the first day of the intervention. Measurements were completed again one week after the last ACT group meeting and a third time a month after the last ACT group meeting. Questionnaires were completed on paper by off-line group participants and on-line by on-line group participants.

Initially, it was designed to provide equal measurement in a control group. Due to diminished motivation in this group and a high level of lost data in the third measurement as only 4 persons provided their follow-up, data from the control group were collected twice (baseline and one month later), both on-line and on paper (due to COVID-19 as control group was collected in October 2020-November 2020).

Table 1. Sociodemographic characteristics of the sample

	Off-line ACT group(N = 20)	On-line ACT group (N = 20)	Control group (N = 20)
Parent's age			
Range	26-49	25-50	24-51
Mean	36.15	37.20	36.00
Standard deviation	5,48	6,07	8,15
Parent's gender			
Male	4 (20.00 %)	1 (5.00 %)	4 (20.00 %)
Female	16 (80.00 %)	19 (95.00 %)	16 (80.00 %)
Place of residence			
Village	2 (10.00 %)	0 (0.00 %)	4 (20.00 %)
> 20.000 residents town	5 (25.00 %)	1 (5.00%)	0 (0.00 %)
> 50.000 residents town	1 (5.00 %)	4 (20.00 %)	5 (25.00 %)
> 100.000 residents town/city	12 (60.00 %)	7 (35.00 %)	9 (4500 %)
> 500.000 residents town/city	2 (10.00 %)	8 (40.00 %)	2 (10.00 %)
Professional status			
Full-time job	9 (45.00 %)	11 (55.00 %)	10 (50.00 %)
Part-time job	3 (15.00 %)	2 (10.00 %)	5 (25.00 %)
Unemployed	8 (40.00 %)	7 (35.00 %)	4 (20.00 %)
Co-care of a child			
Yes	16 (80.00 %)	19 (95.00 %)	17 (85.00 %)
No	4 (20.00%)	1 (5.00 %)	3 (15.00 %)
Child's age			
Range	3-9	3-9	3-9
Mean	5.95	6.95	6.10
Standard deviation	1.82	1.76	2.49
Child's sex			
Male	16 (80.00 %)	12 (60.00 %)	11 (55.00 %)
Female	4 (40.00 %)	8 (40.00 %)	9 (45.00 %)
Child's diagnosis*			
Autism	14 (70.00 %)	12 (60.00 %)	15 (75.00 %)
Asperger's syndrome	6 (30.00 %)	8 (40.00 %)	5 (25.00 %)
Additional child's diagnosis			
Vision impairment	2	-	2
Motor impairment	3	-	-
Hearing impairment	1	-	2

* The study took place in 2020-2021 when DSM-IV was still used in Poland. In 2022, DSM-5 and ICD-11 were officially introduced into Polish and are now used by psychiatrists and psychologists.

Participants did not receive any compensation. The project was approved by the Ethics Committee of the University of Silesia in Katowice, Poland (ID: 20.2019).

Intervention Description

Based on prior research in this area, it was decided to carry out an ACT off-line and on-line four-week intervention for parents of children with autism spectrum disorder aged 3-9 with a control group of parents who did not receive any treatment. Off-line and on-line groups underwent the same protocol as it was reported that the type of intervention (off-line vs. on-line) do not differentiate the outcome (cf. Thompson et al., 2020). Parents were assigned into small groups consisting of maximum 5 persons.

The intervention was delivered in a group format consisting of four two-hour long meetings in a span of one month (one meeting per week). In sum, eight hours of

intervention were delivered based on didactic presentations, group discussion, and group experiential activities in ACT exercises or metaphors. The first two meetings consisted of parts from a protocol presented by Whittingam et al. (2013) and exercises from Harris (2012). The third and fourth meetings consisted of exercises from Harris (2012) and protocols from Corti et al. (2018) and Lunsky et al. (2017). All interventions were delivered by a professional cognitive-behavioral therapist specialized in ACT.

During the first meeting parents were facilitated to introduce themselves and present their expectations towards the intervention. An introduction to ACT concepts was presented through a set of metaphors (e.g. warfare, quicksand, passengers on the bus), didactic presentation and group discussion. Homework was set regarding values (worksheet with a list of values and evaluation of their importance and active living in their accordance). The second meeting was focused on mindful awareness and acceptance (e.g. leaves on the stream metaphor, thoughts are just thoughts, mindfulness exercises). Homework was discussed in terms of what stands in the way of values-oriented living. Another homework was assigned in the form of a worksheet regarding goals, barriers and solutions in terms of living in accordance with one's values. The third meeting focused on committed action exercises (homework discussion and a list of barriers and solutions; time machine exercise) and self-as-context metaphors (chessboard). "Pushing away" exercise, with "bad" and "good" parent traits and one's vision about one's parenting and expectations, was then conducted. In a final, fourth meeting, a tug of war with a monster metaphor was discussed in terms of emotion regulation and acceptance, as well as a funeral exercise was conducted in terms of committed and valued-oriented action. The self-compassion construct was then presented and discussed in terms of ACT-related processes. A summary of the four-week intervention and debrief was discussed.

Measures

Psychological flexibility. The Acceptance and Action Questionnaire (AAQ-II) developed by Bond et al. (2011) in the Polish adaptation by Kleszcz et al. (2018) was used. Flexibility is measured using seven statements (e.g. 'I'm afraid of my feelings') rated on a Likert scale from 1 (always untrue) to 7 (always true). The higher the score obtained by the respondent, the lower the level of psychological flexibility. Cronbach's α for this study was α = .93.

Self-Compassion. Self-Compassion Scale Short by Raes et al. (2011, Polish translation by Kocur, unpublished) was used. The Scale consists of 12 statements (e.g. 'I try to see my failings as part of the human condition') rated on a Likert scale (1-5). Cronbach's α for this study was α = .85.

Ego-resiliency. The Ego-Resiliency Scale (Alessandri et al., 2007, Polish adaptation by Kołodziej-Zaleska & Przybyła-Basista, 2018) was used. The scale consists of 12 items (e.g. 'I get over my anger at someone reasonably quickly') rated on a 4-point Likert scale. Cronbach's alpha calculated for this study was α = .81.

Quality of life. Quality of Life Questionnaire by Straś-Romanowska (2005), referring to the multidimensional human concept, was used. The Questionnaire consists of 60 statements (e.g. 'I feel that I have found my place in life') and defines four dimensions of quality of life. For the purposes of the present study the total score (α = .91) was used as an indicator of the quality of life.

Psychological distress. The Depression, Anxiety and Stress Scale (DASS-21) by Lovibond & Lovibond (1995; Polish translation by Makara-Studzińska et al., 2013, unpublished) was used. The scale consists of 21 questions (e.g. ''I felt I was close to panic') rated on a scale from 0 to 3 and is divided into three subscales: 1) depression scale (α = .93), anxiety (α = .95) and stress (α = .92).

Data Analyses

Demographic variables were analyzed through descriptive statistics. At the beginning the baseline (pre-intervention) measurements of studied variables were compared in all three groups – ACT online, ACT off-line and the control group to establish if the baseline conditions for all groups were similar. Next potential differences between results of ACT interventions in the stationary and on-line forms were examined. In order to determine the effectiveness of ACT interventions two procedures were applied. First, within-subject repeated measures analysis of variance (ANOVA) evaluated changes in outcome measures across the three-time points (baseline, post-intervention and follow-up) in the case of ACT groups. Significant results were then followed by post-hoc pairwise comparisons for three configurations: baseline to post-intervention, baseline to follow-up, and post-intervention to follow-up. An additional test was performed to check the change in the outcome of two time points in the control group. Second, in order to examine both within-subject and between-subject effects jointly, the data were transformed to obtain "change scores" by subtracting the baseline scores from the post-treatment scores (second measure). Change scores obtained in the ACT groups were compared to the change scores obtained in the control group (as in Hahs Dixon & Paliliunas, 2019).The results indicated a change due to the ACT intervention in comparison to the no-intervention (control) condition.

All calculations were made using JASP 0.14.1.

RESULTS

The baseline comparisons between groups

ANOVA test showed no significant differences between baseline (pre-intervention) measurements of any variable studied in three types of groups, except for self-compassion ($F = 3.70$, $p < .05$). Bonferroni-corrected contrasts revealed differences between ACT on-line group and control group ($t = -2.67$, $p < .05$). Hence, at the baseline all participants comprised a relatively homogeneous sample.

The comparison of on-line and off-line interventions

Mann-Whitney U test was conducted in order to establish differences between the effectiveness of ACT interventions in the stationary and on-line form. The results obtained revealed no significant ($p > .001$) differences between the second and third measurements. It was decided to continue the analyzes in a separate way for off-line and on-line ACT interventions as the separate analyzes allowed for a more detailed look at the mechanisms and specificity of the two types of interventions under study.

Effectiveness of ACT training through timepoints: within-subject comparisons

Summary of means and standard deviations of the variables studied at baseline, post-intervention and follow-up in ACT groups, as well as baseline and second measure in a control group, are presented in Table 2. Mauchly's test indicated that the assumption of sphericity had not been violated for any measures. F-value is reported for ACT groups, W-value refers to a control group.

The results obtained indicated statistically significant changes in all examined variables in both groups using ACT intervention. The effect sizes varied from low to medium and differed depending on the form of intervention, with the highest effect size index reported for the quality of life in the group of parents participating in the on-line ACT training ($\eta^2 = .80$). As of the control group, Wilcoxson's signed-pair test showed no significant differences between the two measurements in any studied variable.

Subsequent pairwise comparison results for outcome measures in an off-line (Table 3) and an on-line (Table 4) ACT groups are presented below.

Bonferroni-corrected contrasts revealed similar results in both off-line and on-line ACT groups. Psychological flexibility, self-compassion, ego-resiliency and quality of life rates significantly improved from pre to post and pre to follow-up; depression, anxiety and stress rates significantly decreased from pre to post and pre to follow-up. In all cases, no significant changes were identified from post to follow-up which implies that the changes achieved in post-intervention were maintained in follow-up.

Table 2. Means (M) and standard deviations (SD) of measures in the experimental and control groups at baseline, post-intervention and follow-up. Within subject comparisons.

Type / variable	Baseline (pre-intervention) M (SD)	Post-intervention (second measure) M (SD)	Follow-up M (SD)	F / W (df)	η^2	p value
Off-line ACT (N = 20)						
Psychological flexibility	21.00 (8.67)	14.75 (7.18)	13.05 (5.16)	21.969 (2)	.54	< .001
Self-compassion	36.75 (7.95)	44.60 (7.41)	45.55 (7.18)	34.747 (2)	.65	< .001
Ego-resiliency	32.65 (5.75)	39.90 (5.15)	40.30 (4.43)	57.507 (2)	.75	< .001
Quality of life	183.80 (20.35)	200.60 (14.69)	205.35 (15.70)	29.651 (2)	.61	< .001
Depression	4.70 (4.14)	2.25 (3.21)	1.45 (1.73)	13.511 (2)	.42	< .001
Anxiety	2.55 (2.64)	1.25 (2.07)	0.75 (1.21)	10.448 (2)	.35	< .001
Stress	6.80 (4.82)	2.85 (3.22)	2.00 (2.05)	27.872 (2)	.59	< .001
On-line ACT (N = 20)						
Psychological flexibility	25.55 (12.49)	15.00 (5.37)	14.60 (5.42)	35.214 (2)	.65	< .001
Self-compassion	34.25 (10.08)	42.70 (6.69)	43.90 (5.99)	38.533 (2)	.67	< .001
Ego-resiliency	34.40 (7.09)	39.00 (5.22)	39.55 (5.08)	22.283 (2)	.54	< .001
Quality of life	183.35 (24.95)	196.50 (24.02)	197.45 (23.54)	76.323 (2)	.80	< .001
Depression	9.25 (10.68)	2.90 (2.69)	2.05 (2.37)	8.727 (2)	.31	< .001
Anxiety	4.60 (5.31)	2.30 (2.72)	1.65 (2.03)	9.321 (2)	.33	< .001
Stress	7.55 (6.25)	3.30 (2.54)	2.40 (2.30)	24.156 (2)	.56	< .001
Control group (N = 20)						
Psychological flexibility	25.65 (13.77)	24.90 (12.69)	-	35.00	-	.46
Self-compassion	41.600 (7.84)	41.05 (6.97)	-	53.00	-	.28
Ego-resiliency	32.85 (6.65)	32.90 (6.36)	-	20.00	-	.80
Quality of life	179.55 (22.09)	177.350 (20.27)	-	68.50	-	.11
Depression	6.35 (5.63)	5.90 (5.32)	-	23.50	-	.12
Anxiety	4.30 (5.99)	4.00 (5.83)	-	25.50	-	.30
Stress	9.05 (5.97)	8.35 (6.02)	-	55.00	-	.06

Table 3. Pairwise comparisons from pre to post, pre to follow-up, and post to follow-up assessments on the outcome measures in the off-line ACT group.

Variable	Mean difference	95% CI for Mean Difference		Standard error	p value
		Lower	Upper		
Psychological flexibility					
Pre to post	6.25	2.94	9.56	1.26	< .001
Pre to follow-up	7.95	3.93	11.97	1.53	< .001
Post to follow-up	1.70	-0.72	4.12	0.92	0.081
Self-compassion					
Pre to post	-7.85	-11.56	-4.14	1.41	< .001
Pre to follow-up	-8.80	-12.28	-5.32	1.32	< .001
Post to follow-up	-0.95	-2.32	0.42	0.52	0.084
Ego-resiliency					
Pre to post	-7.25	-9.68	-4.82	0.93	< .001
Pre to follow-up	-7.65	-10.17	-5.13	0.96	< .001
Post to follow-up	-0.40	-1.43	0.63	0.39	0.322
Quality of life					
Pre to post	-16.80	-24.03	-9.57	2.75	< .001
Pre to follow-up	-21.55	-30.86	-12.24	3.55	< .001
Post to follow-up	-4.75	-11.06	1.56	2.40	0.063
Depression					
Pre to post	2.45	0.79	4.10	0.63	0.002
Pre to follow-up	3.25	1.29	5.21	0.75	0.001
Post to follow-up	0.80	-0.68	2.28	0.56	0.173
Anxiety					
Pre to post	1.30	0.09	2.51	0.46	0.021
Pre to follow-up	1.80	0.82	2.78	0.37	< .001
Post to follow-up	0.50	-0.50	1.50	0.38	0.204
Stress					
Pre to post	3.95	1.90	5.99	0.78	< .001
Pre to follow-up	4.80	2.75	6.85	0.78	< .001
Post to follow-up	0.85	-0.31	2.01	0.44	0.070

Table 4. Pairwise comparisons from pre to post, pre to follow-up, and post to follow-up assessments on the outcome measures in the on-line ACT group.

Variable	Mean difference	95% CI for Mean Difference		Standard error	p value
		Lower	Upper		
Psychological flexibility					
Pre to post	10.55	6.84	14.26	1.48	< .001
Pre to follow-up	10.95	7.24	14.66	1.48	< .001
Post to follow-up	0.40	-3.31	4.11	1.48	0.788
Self-compassion					
Pre to post	-8.45	-11.45	-5.45	1.20	< .001
Pre to follow-up	-9.65	-12.65	-6.65	1.20	< .001
Post to follow-up	-1.20	-4.20	1.80	1.20	0.323

Table 4 cont.

Variable	Mean difference	95% CI for Mean Difference		Standard error	p value
		Lower	Upper		
Ego-resiliency					
Pre to post	-4.60	-6.72	-2.48	0.85	< .001
Pre to follow-up	-5.15	-7.27	-3.03	0.85	< .001
Post to follow-up	-0.55	-2.67	1.57	0.85	0.520
Quality of life					
Pre to post	-13.15	-16.34	-9.95	1.28	< .001
Pre to follow-up	-14.10	-17.29	-10.90	1.28	< .001
Post to follow-up	-0.95	-4.14	2.24	1.28	0.461
Depression					
Pre to post	6.35	1.63	11.07	1.88	0.003
Pre to follow-up	7.20	2.48	11.92	1.88	0.001
Post to follow-up	0.85	-3.87	5.57	1.88	0.654
Anxiety					
Pre to post	2.30	0.50	4.10	0.72	0.005
Pre to follow-up	2.95	1.15	4.75	0.72	< .001
Post to follow-up	0.65	-1.19	2.45	0.72	0.371
Stress					
Pre to post	4.25	2.27	6.23	0.79	< .001
Pre to follow-up	5.15	3.17	7.13	0.79	< .001
Post to follow-up	0.90	-1.08	2.88	0.79	0.263

Effectiveness of ACT training: between-subject comparison of change

As the results obtained in both ACT groups – with on-line and off-line interventions – in all previous analyses did not differ significantly, the comparison of change was run for the whole ACT group and the control group. A summary of means and standard deviations of change scores in all studied variables in both groups together with results of Mann-Whitney U test and effect sizes given by the rank biserial correlation are presented in Table 5.

The results showed significant differences between the ACT and control groups in change scores related to all variables. It indicated that taking into consideration the post-treatment /second measure scores in relation to the baseline scores the ACT intervention was revealed to be effective in enhancing the crucial resources, increasing quality of life and decreasing psychopathological symptoms in parents of children with ASD.

DISCUSSION

The unique value of the present study was to demonstrate the effectiveness of the ACT intervention in developing psychological flexibility, self-compassion, and ego-resiliency, reducing psychological distress, and improving quality of life in a group of parents of children with autism disorder in Poland, and to compare results of off-line and on-line ACT interventions while using the same protocol. The obtained results revealed significant differences between both ACT groups and a control group which allows for the conclusion that ACT intervention was an effective approach in enhancing parents' well-being and psychological skills. Furthermore, the results showed no significant differences between on-line and off-line ACT interventions in relation to all studied variables, which allows for the conclusion regarding equal effectiveness of both forms.

Regardless of the intervention form, the level of psychological flexibility, self-compassion, ego-resiliency, and the quality of life increased significantly in the ACT groups, while psychopathological symptoms (depression, anxiety, stress) significantly decreased. More importantly, the changes obtained after one week persisted one month after the end of ACT training, which allows for the assumption of the relative stability of its effectiveness and continued attendance in the training was not necessary to sustain obtained effects.

Additionally, the comparison with the control group showed significant differences in the second measurement. Initially, all participants were relatively homogeneous in terms of symptoms and resource potential (no significant differences were found between the three groups in the first measurement, excluding self-compassion), and differences only appeared after the implementation of ACT interventions. Interestingly, the distribution of differences

Table 5 Means (M) and standard deviations (SD) of change scores (post-intervention/second measure – baseline) in the ACT and control groups. Between subject comparisons.

Change scores for:	Group	*M*	*SD*	*Min*	*Max*	*W*	*p*	*Effect size**
Psychological flexibility	ACT	-8.40	7.15	-26.00	3.00	115.00	< .001	-.71
	Control	-0.70	2.54	-10.00	1.00			
Self-compassion	ACT	8.15	6.27	-4.00	26.00	772.00	< .001	.93
	Control	-0.55	2.01	-7.00	2.00			
Ego-resiliency	ACT	5.93	4.63	-6.00	15.00	758.50	< .001	.87
	Control	0.05	0.89	-1.00	2.00			
Quality of Life	ACT	14.98	10.02	1.00	40.00	782.50	< .001	.96
	Control	-2.20	5.74	-18.00	8.00			
Depression	ACT	-4.40	7.67	-47.00	0.00	141.00	< .001	-.65
	Control	-0.45	1.15	-3.00	2.00			
Anxiety	ACT	-1.80	2.84	-10.00	4.00	246.50	< .001	-.38
	Control	-0.30	1.13	-4.00	1.00			
Stress	ACT	-4.10	3.73	-12.00	4.00	154.00	< .001	-.62
	Control	-0.70	1.42	-4.00	2.00			

Note. *For the Mann-Whitney test, effect size is given by Cohen's d.

depended on the form of training: when comparing the second measurements obtained by parents participating in the on-line ACT training and the control group, no differences were noted in the levels of self-compassion, depression, and anxiety. On the other hand, the comparison of the off-line ACT group results with the control group results showed significant differences in relation to all variables except for self-compassion. These results encourage at least two further hypotheses. The first concerns the recurring theme of the lack of differences in self-compassion: perhaps parents who decided not to participate in the ACT intervention already had competences in the field of compassion towards themselves and that was one of the reasons why they chose not to take part in the training. Of note, the mean of self-compassion in the first measurement in the control group was $M_{control}$ = 41.60, and the means for off-line and on-line groups were respectively $M_{off\text{-}line}$ = 36.75 and $M_{on\text{-}line}$ = 34.25. It could be hypothesized that self-compassion alone was an insufficient resource in maintaining mental health and well-being in a criteria group. Hence, the development of psychological flexibility and ego-resiliency rates through ACT training allowed for a significant improvement in the sense of the quality of life and reduction of stress symptoms, and the indicators in the control group remained at a lower level. The second hypothesis is related to the lack of differences in depression and anxiety symptoms in the on-line ACT training group and the control group. On the one hand, it can be hypothesized that persons with robust symptoms of affective and anxiety disorders are reluctant to use on-line support (Thompson et al., 2020). On the other, this claim seems to be inaccurate for at least two reasons. Firstly, the mean of depression results in the on-line group in the first measurement was higher than in the other two groups ($M_{on\text{-}line}$ = 9.25; $M_{off\text{-}line}$ = 4.70; $M_{control}$ = 6.35), secondly, the on-line formula was forced by environmental conditions (ongoing COVID-19 pandemic, significant reduction in psychological support opportunities). These conditions could also have a significant impact as parents participating in the off-line ACT group only partially experienced the pandemic outburst (off-line training took place November 2019-February 2020, hence before the pandemic, and in summer 2020 when the restrictions were smaller than in autumn 2020), so their environmental burden could have been lower. This result may also suggest that, despite the fact that there were no differences between the applied forms of work, participation in the off-line group might have a stronger impact on the reduction of psychopathological symptoms and that assumption is in line with effect sizes indices discussed below.

Noteworthy differences in the effect sizes in comparisons of the results of participants in two ACT training forms were established: the effect size for the psychological flexibility was greater in the on-line ACT group (η^2 = .65 in comparison to .54), while ego-resiliency – in the off-line ACT group (η^2 = .75 in comparison to .54). The effect size indices of quality of life were higher in the on-line group (η^2 = .80), while depression (η^2 = .42), anxiety (η^2 = .35) and stress (η^2 = .59) symptoms – in the off-line group; the effect size for self-compassion was similar in both groups (η^2 = .65-.67). The differences in the effect sizes may suggest different mechanisms and effectiveness related to the specificity of on-line vs. off-line forms of psychological support. However, it should be emphasized that effect sizes in question relate to a relatively short period of time as post-tests were performed one week and a month after the end of the intervention, therefore they should be analyzed with caution. Although, a meta-analysis of the effectiveness of

on-line ACT (iACT) conducted by Thompson et al. (2020) showed low effect sizes in the context of depression, anxiety and quality of life compared to control groups. Despite the maintenance of the iACT effectiveness over a period of 9 and 18 months, the mean effect size of the iACT (η^2 = .24-.38) was lower than demonstrated by the off-line ACT form (η^2 = .42; Öst, 2014) – these results seem to be consistent with the results obtained in the current study.

Significant development of psychological flexibility, self-compassion and ego-resiliency in the course of both on-line and off-line interventions was achieved. The result is consistent with previous reports on the effectiveness of ACT in the group of parents of children with ASD (Hahs et al., 2019; Taghavei et al., 2019) and in other clinical trials (Li et al., 2021) in developing psychological flexibility. Also, the effectiveness of ACT training in the development of psychological flexibility, as well as self-compassion and ego-resiliency, are in line with previous research discussing the latter as potential flexibility correlates (Marshall & Brockman, 2016; Chan et al., 2018). Indeed, it is hypothesized that a compassionate attitude towards oneself is related to both acceptance and defusion (Marshall & Brockman, 2016), and both resources share one of the key processes in the form of mindfulness (McLean et al., 2018). In turn, ego-resiliency, described as an adaptive response to the environment (Bonanno, 2005), is associated with behavioral expression and taking actions to adapt to environmental requirements (Elliot et al., 2019). Therefore, the hypothesis that ego-resiliency shows similarities to one of the psychological flexibility processes in the form of committed action aimed at undertaking valuable activities despite mental suffering is confirmed (Pyszkowska, 2020).

CONCLUSIONS

The results can be used both in designing further scientific research and in clinical practice, especially in the psychological care of families of persons diagnosed with ASD, with special focus on the area of developing psychological skills and the use of short-term therapeutic methods. Of note, despite similar protocol, there was a substantial qualitative difference in the interaction between the participants of the two ACT groups. In the off-line ACT intervention, group discussion and sharing one's experience was considered as a natural part of the group dynamics; although this element was retained and proposed during on-line ACT groups, the participants' activity was significantly lower (e.g., no spontaneous interactions between participants). That does not indicate a lack of commitment, but rather potential discomfort associated with on-line form of communication which during fall 2020 was still new to many people. Therefore, parents participating in on-line ACT training were more willing to express themselves in the form of answers to the direct questions from the therapist, without interacting with each other, which was, in turn, typical for the off-line ACT group. Despite that, the need for on-line psychological support in both COVID-19 and post-pandemic times is getting wider, and therefore having reliable data on the potential effectiveness of short-term interventions in the on-line form that does not differ from the off-line one seems to be a vital application value. Before COVID-19, parents of children with ASD in Poland report lack of systemic psychological help and significant difficulties in both affording and reaching psychotherapy or psychological support (e.g. due to communication exclusion, support groups for parents run only in big cities, cf. Płatos, 2016). Hence, the increase of the availability of psychological support to people who often are at risk of being excluded from a traditional (off-line) form of help is of highest priority in planning systemic adjustments in the future (cf. Płatos, 2016).

Despite its clinical applicability, several limitations of the current study must be highlighted. First is no randomization (discussed in the Methods section) and a relatively small number of participants (20 persons in each research group, 60 in total), especially in terms of a very small number of male participants. Additionally, despite the control group that did not receive any treatment, lack of comparison to different modalities (e.g. Compassion-Focused Therapy, classic CBT, or mindfulness training) might be considered as a limitation in terms of the real effectiveness of ACT. No differentiation of child's symptoms was established; hence it was impossible to compare interventions' effectiveness in different caregiving contexts (e.g. in parents of children with low communication skills vs. those with high skills). Finally, it should also be noted that only two measurements were made after the finalization of ACT training, and these were made after a relatively short period of time (after a week and a month); hence inferences on the sustainability of the training effect are limited. All these limitations shall be considered in the further studies designed in this area.

COMPLIANCE WITH ETHICAL STANDARDS

The project was approved by the Ethics Committee of the University of Silesia in Katowice, Poland (ID: 20.2019). All Participants provided informed consent.

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