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TrASDition Training: An online parental training for transition-age youth with autism spectrum disorder

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ABSTRACT

Transition to the adult age represents a rather challenging period of life for youth with Autism Spectrum Disorder (ASD) and for their families.

Given the actual lack of integrated healthcare systems for autistic young-adults, enhancing parental skills could represent a feasible program to improve skills preparatory for transition in adult life.

The online approach, providing easy access to services which otherwise would burden a daily family organization, already strenuous for a family with an autistic person, can represent an innovative way of delivering intervention.

Therefore, we developed an online psychoeducational parental training, named TrASDition Training, with a 6 months duration, addressed to parents of autistic youth with and without Intellectual Disability during the transition age.

The aim of this study was to longitudinally evaluate the impact of the online parental training on the adaptive functioning, on the repetitive and problematic behaviors of ASD youth (n = 23) and on parental stress.

After 6 months of Training, we found a significant improvement in adaptive functioning of ASD participants and a reduction of parental stress.

1. Introduction

Autism Spectrum Disorder (ASD) is a neurodevelopmental disorder, with onset during the early childhood but with core symptoms of social communication deficit and restricted and repetitive behaviors, including sensorial abnormalities, persisting all life long, with a significant impairment of social functioning (American Psychiatric Association 2013).

Over the last years, early diagnosis and early intervention have represented the main research areas within ASD, stealing focus from the transition to adulthood. Due to its characteristic physical, psychological, environmental change, the transition age represents a rather vulnerable and challenging period of life for youth with ASD and for their families (Mazzone et al., 2012; Smith et al., 2014).

Education, employment, independent living, community integration are crucial areas for a successful transition to adulthood. However, during the transition age, the same service network (home, school, healthcare) operating in childhood is no longer available and is not equally competent (Anderson et al., 2018).

In fact, in adult age, a lack of comprehensive, integrated healthcare services and psychoeducational programs addressed to both ASD individuals and their parents, has been reported and connected to a worst outcome, reduced rates of job employment and self-sufficiency (Dawn and Wehman, 2009; Shattuck et al., 2012; Howlin and Moss, 2012; Howlin, 2013; Ames et al., 2020). Indeed, almost 80% of autistic individuals doesn't have independent living and requires high levels of support in adolescence and adulthood; whereas only in 20% of cases, a good outcome with a job employment was estimated, however always requiring supervision (Steinhausen et al., 2016).

Noteworthy, regarding ASD Italian population, few studies have been conducted on the topic. Tunesi et al (2019), in a retrospective study on the change in healthcare services utilisation through the transition

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age, underlined the need of further studies evaluating the actual needs of ASD individuals with the aim to plan future public healthcare policies and interventions.

Transitioning psychoeducational programs have been related not only to an improvement of the ASD adolescent's outcome (self-determination, career decision ability, social skills, transition readiness) (Hagner et al., 2012; DaWalt et al., 2018; White et al., 2017; White et al., 2019) but also to an increase of the parental-child interaction and enhancement of parental mental health (decrease of stress and depressive symptoms) (DaWalt et al., 2018; Smith et al., 2012; 2014; Cheak--Zamora et al., 2015). The undermining of the parental well-being (i.e. stress increase), can, in turn, influence education, behavioral and developmental trajectories across adolescence (Abbeduto et al., 2004, Greenbergh et al., 2006; Baker et al., 2011; Smith et al., 2014, Giovagnoli et al., 2015; Mugno et al., 2007; Mazzone et al., 2018). This highlights the important role of the family for ASD individuals and the need to support parents during this delicate phase of life (Renty and Royers, 2006; Smith et al., 2012; Chen et al., 2019; Kirby et al., 2016; Snell-Rood et al., 2020). Indeed, transition family centered interventions have been reported as more beneficial and are considered promising models for transition programs, in particular when provided in school or clinical settings (Smith et al., 2006; Hagner et al., 2012; Smith et al., 2012, 2014; White et al., 2017, 2019).

Amongst these, *Transitioning Together* (Smith et al., 2014; Da Walt et al., 2017), an 8 week multi-family group psychoeducation program, including both parent and teen group sessions, demonstrated efficacy in improving adolescents' social functioning and in reducing family distress.

The Stepped Transition in Education Program for Students with ASD (STEPS) (White et al., 2017, 2019) is a transition support service addressed to emerging adults with ASD delivered in two steps (secondary school and/or post-secondary education) which resulted efficacious in preparing students for transition to adult-life and acceptable for the youths and their parents who were both involved in the program. In particular, the activities provided for ASD students were delivered in person whilst their parents were offered online sessions.

Whereas, the The Better OutcOmes & Successful Transitions for Autism (BOOST-A) is a transition psychoeducational program completely web delivered, addressed to 49 adolescents with ASD without Intellectual Disability (ID), which has proven effectiveness in improving opportunity for self-determination at home and career exploration after 12 months of intervention (Hatfield et al., 2017). The BOOST-A, being an online program, had the great benefit of not burdening the family's daily organization (no necessity of transport, possibility to visualize the video lessons at whatever moment of the week). However, the psychoeducational intervention provided was specifically directed to high functioning ASD adolescents, whereas parents were not the direct target of the program.

To our knowledge, no previous research on ASD transition age youth, of both low and high functioning, employed an online approach for a specific parental transitioning program.

Therefore, given the possible benefits of an online program and the central role of the parents during transition to adulthood, we conducted a longitudinal study on the efficacy of an online not individualized parental program named TrASDition Training focused on main challenges of transitioning age.

The aim of the study was to longitudinally evaluate the impact of the parental TrASDition Training on the adaptive functioning, the repetitive and problematic behaviors of ASD youth with and without ID. Moreover, we investigated the effectiveness of the Training in reducing parental stress.

We hypothesize that, after 6 months of TrASDition Training, the ASD participants would show an adaptive skills' improvement, a reduction of atypical and problematic behaviors and a decrease of parental stress.

2. Methods

The study protocol was approved, registered (R.S. #78/19) and monitored by the local Institutional Review Board (Tor Vergata University-Hospital Ethical Review Committee). Informed consent of a parent or legal guardian was obtained for each participant.

Our sample was constituted by children with ASD coming from the clinical database of the Child Psychiatry Unit of the University of Rome Tor Vergata Hospital. Recruitment was performed between March and April 2019. 38 youth with ASD were assessed for eligibility by a multidisciplinary team (child psychiatrists and psychologists) (Figure 1) who contacted the families by phone, described the study, and invited them to participate. To be eligible, participants were required to have: a diagnosis of ASD, age ranging from 14 to 20 years, any value of Intelligence Quotient (IQ). Exclusion criteria included genetic disorders, epilepsy, or other medical disorders. 15 individuals were excluded from the sample (13 declined to participate; 2 did not meet inclusion criteria). A total of 23 participants (mean age 16.82 years) were finally included in the study (18 males; 5 females) (Fig. 1).

ASD diagnosis was based on the Diagnostic and Statistical Manual of Mental Disorders-Fifth Edition (DSM-5) (APA, 2013) and supported by the administration of the Autism Diagnostic Observation Schedule–-Second Edition (ADOS–2) (Lord et al., 2012).

At baseline (pre-intervention) and after 6 months of the parental training (post-treatment evaluation), all ASD youth underwent a comprehensive evaluation performed by child psychiatrists, as described below. 3 participants dropped out the study because they did not complete the post-treatment evaluation (skipped the planned appointment), therefore the final sample was constituted by 20 participants (mean age 17; 17 males, 3 females) (Fig. 1).

TrASDition Training was not considered as a replacement treatment, but as a complementary intervention. In fact, during the study, all participants continued the therapeutical intervention (i.e. behavioral, pharmacological) ongoing before the beginning of the TrASDition Training.

2.1. Evaluation

At baseline (T0-pre treatment), before the TrASDition Training, an evaluation of ASD youth cognitive skills, autism symptoms, adaptive functioning, repetitive and restricted interests, problematic behaviors and parental stress was performed with the measures described below.

After 6 months of the parental training (T1-post treatment), ASD participants underwent the same evaluation except for the IQ assessment and the ADOS-2, which were not re-administered, because we did not expect any improvement in these skills and symptoms.

Although both mothers and fathers were involved in the Training, only one parent (the one most in contact with the son/daughter) filled in the questionnaires included in the T0 and T1 evaluation.

2.1.1. ASD diagnostic measure

Participants' ASD diagnosis was confirmed by the ADOS-2 (Lord et al., 2012) performed by a licensed clinician. The ADOS-2 is a semi-structured observational assessment measuring current autistic symptoms, including socio-communicative difficulties and repetitive and restricted behavior. The ADOS-2 is divided into different separate modules. Each module is aimed at a specific level of expressive language ability (ranging from pre-verbal to fluent speech). The choice of modules is based on the participant's age and expressive language level. In the present study, participants were administered different modules (Module 1 to 4) according to their expressive language level.

In order to compare scores across different modules, the ADOS-2 Calibrated Severity Score (CSS) was calculated for each participant. The CSS, ranging from 1 to 10, identifies 4 different categories (none, mild, moderate, high) and provides a measure for the level of autism severity.

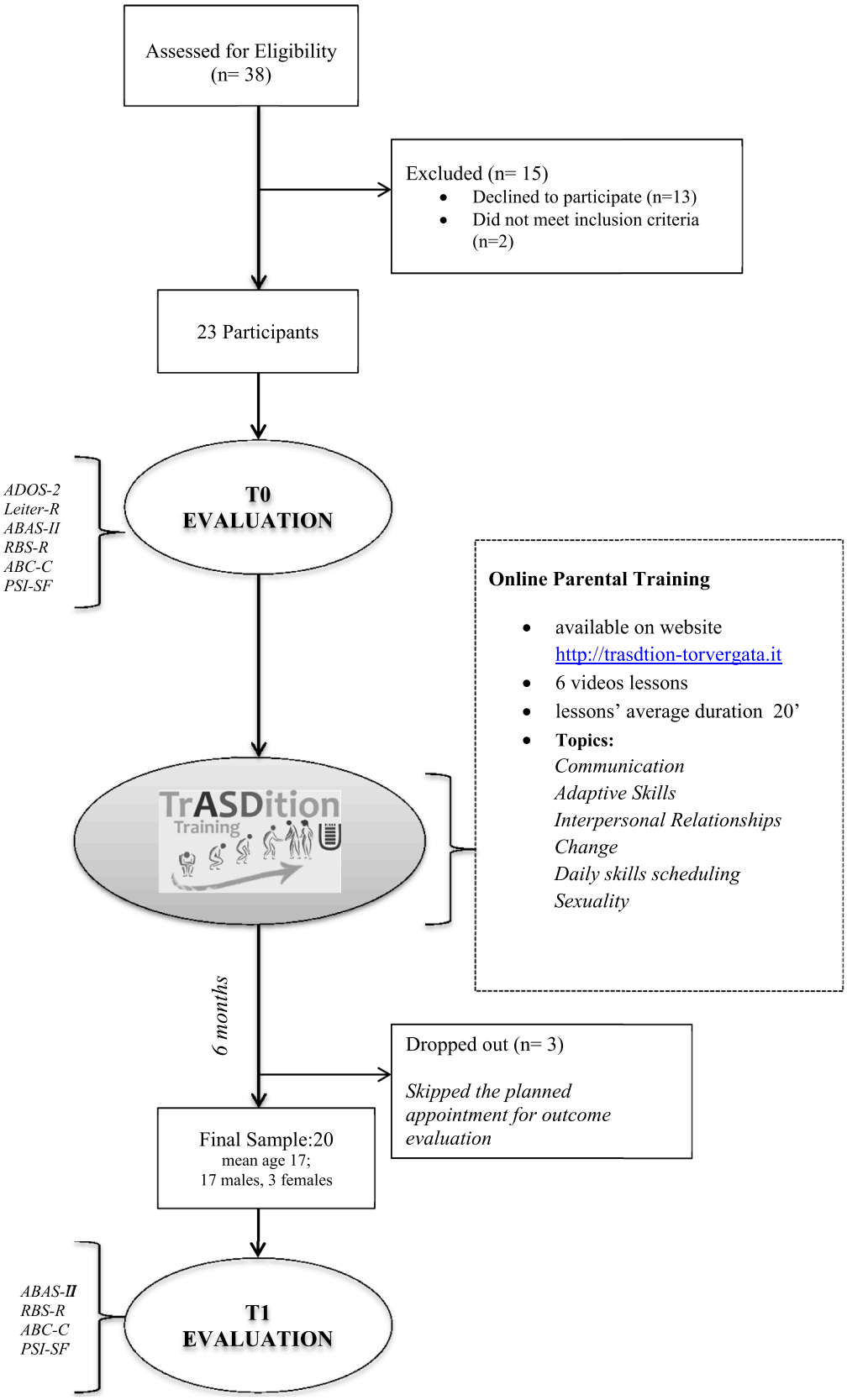

Fig. 1. TrASDition Training: flowchart of the study.

2.1.2. Cognitive functioning measure

All participants underwent a cognitive evaluation through the Leiter International Performance Scale-Revised (Leiter-R) (Roid and Miller, 1997).

The Leiter-R provides a nonverbal Intelligence Quotient (IQ) in subjects ranging in age 2-20 years. The wide age range and the nonverbal administration, suitable for both participants with and without good language skills, represent the main reasons why we chose this instrument as a measure of cognitive functioning.

In this study, only the subtests of Visualization and Reasoning Battery necessary for the determination of Brief IQ were administered to ASD participants.

Raw scores are converted in scaled and finally in composite score, having a population mean of 100 and a standard deviation of 15.

2.1.3. Adaptive functioning measure

The Adaptive Behavior Assessment System-Second Edition (ABAS-II) (Oakland, 2011), a parent-report checklist, was employed in order to assess the participants' adaptive functioning. According to the age, participants' parents were administered the "5-21 years" form.

Caregivers are asked to rate the child's competence to implement an activity (from 0 = "not able to" to 3 = "able to do it and always performs it when needed") in relation to 10 skill areas (communication, use of environment, preschool competences, domestic behavior, health and safety, play, self-care, self-control, social abilities, motility). These functioning areas are grouped in three main adaptive domain scores: 1) conceptual (CAD); 2) practical (PAD); 3) social (SAD). In addition, a General Adaptive Composite (GAC) score is given by the sum of scaled scores from the 10 skill areas. Raw scores are converted in scaled and finally in composite score, having a population mean of 100 and a standard deviation of 15.

For the statistical analysis, we have used composite scores of all 3 adaptive domains (CAD, PAD, SAD) plus GAC.

2.1.4. Repetitive behavior and restricted interests assessment

The Repetitive Behavior Scale Revised (RBS-R) (Bodfish et al., 2000) is a self-report scale completed by parents investigating repetitive behaviors and restricted interests. In our study we have used the Italian version of RBS-R (Fulceri et al., 2016).

The RBS-R questionnaire consists in 43-items rating repetitive behaviors on 4-point likert scale (ranging from 0 to 3) depending on the extent (frequency, severity) of the problem.

Items are organized in six subscales: 1) Stereotypic Behavior; 2) Self-injurious Behavior; 3) Compulsive Behavior; 4) Ritualistic Behavior; 5) Sameness Behavior 6) Restricted Interests Behaviors.

The five-factor solution was used for the scoring (Lam and Aman, 2007). The five-factor solution implies that the Ritualistic Behavior and Sameness Behavior subscales are integrated in one subscale named the Ritualistic/Sameness Behavior.

The raw score of each subscale was calculated adding all the items provided for the scoring. Finally, the sum of all five subscales scores was calculated.

2.1.5. Problematic behaviors assessment

The Aberrant Behavior Checklist–Community (ABC-C) (Aman and Singh, 1994) is a 58-item, parent-rated scale which assesses challenging behaviors in children (Kaat et al., 2014; Salehi et al., 2018). ABC-C items are rated on a 4-point likert scale (ranging from 0 to 3) and grouped into five subscales: 1*) Irritability, Agitation and Crying; 2) Lethargy/Social Withdrawal; 3) Stereotypic Behavior; 4) Hyperactivity/Noncompliance; 5) Language/Inappropriate Speech*.

We have used raw subscales and raw total scores for the statistical analysis.

2.1.6. Parental stress measure

The Parental Stress Index Short Form (PSI-SF) (Abidin, 1995) is a self-report measure of the stress level of a person in the role of a parent.

The PSI-SF, developed from the full length 120 items form, is an abbreviated version of 36 items grouped into 3 subscales (12 items each): Parental Distress (PD), Parent-Child Dysfunctional Interaction (P-CDI), and Difficult Child (DC).

PD provides a measure of feeling of competence, conflict with a partner, social support, restriction and depression due to parenting.

P-CDI evaluates parental satisfaction with the child and their relation with him.

DC measures the parental difficulty in taking care of the child.

Finally, a PSI Total subscale, obtained from the sum of all scores, provides an indication of the overall stress of a person in the role of a parent.

For 33 items, parents are asked to rate their stress using 5 response options: from 1 (strongly disagree) to 5 (strongly agree). Instead, 3 items (22, 32, 33) provide a non-Likert-type response choice.

For each subscale a percentile score was calculated. Scores equal or above 90 percentile amount to a clinically significant stress for all subscales, except for P-CDI where 85 is already considered a significant cut off.

On the basis of the percentile ($\geq 90^{\circ}$ for PD, DC and Total; $\geq 85^{\circ}$ for P-CDI), we dichotomized the sample in Clinically Stressed (CS) and Non Clinically Stressed (NCS) parents.

2.2. Parental training

The online parental training, addressed to ASD youth parents, was constituted by a total of 6 videos lessons, recorded by a multidisciplinary team (child psychiatrists and psychologist) and available on the web platform http://trasdtion-torvergata.it, prior authorized login (Fig. 1).

The videos, of a mean duration of 20 minutes, displayed 6 topics considered as crucial themes in the transition to the young adult age: 1) Communication; 2) Adaptive Skills; 3) Interpersonal Relationships; 4) Change; 5) Daily skills scheduling; 6) Sexuality.

Final goal of TrASDition Training was to learn strategies in order to face the transition challenges improving communication abilities, adaptive skills and social relationships. Specific goals of each module are described in Table 1.

Noteworthy is that TrASDition training did not provide an individualized treatment for participants and all the topics were developed for both low and high functioning ASD individuals (Table 1). Parents implemented the skills addressed in the training for a 6 months period. Families' active participation was followed by weekly phone calls, during which they were reminded to visualize videos.

2.3. Statistical analyses

Changes in ABAS-II, RBS-R, ABC-C, and PSI-SF scores between T0 and T1 (pre- and post-parent training) were evaluated with the Related Samples Wilcoxon Signed Rank Test. Categorical changes between T0 and T1 were evaluated with the Related Samples McNemar Test. Non parametric statistics was chosen because of the nonparametric characteristics of the score distributions and of the limited sample-size. An alpha level of 0.05 was used for all statistical analyses. Results, if not otherwise specified, are given as means ± SD. All statistical analyses were performed using SPSS v.23.0 (IBM Corp., Armonk, NY, USA).

3. Results

3.1. Clinical summary

At baseline, the whole sample was characterized by a mean IQ of 84 SD 29.19 (IQ range 36-135; median IQ 82; 9 participants with Intellectual Disability (IQ$\leq$ 70), 11 without ID (IQ $>$ 70)) and a median ADOS-2 CSS of 7 (range 2-10), indicating a moderate level of autistic symptoms severity.

Table 1

TrASDition Training: topics and goals of the modules. Shown in the table the topics and main goals of each module (Communication, Adaptive Skills, Interpersonal Relationship, Changement, Daily Skills Scheduòing, Sexuality) of the parental Training. Depending on the level of functioning of their sons and daughters, different goals were setted.

	Communication	Adaptive Skills	Interpersonal Relationships	Change	Daily skills scheduling	Sexuality
GOALS	*Learn strategies for implementing communication skills:*	*Learn strategies for improving adaptive skills:*	*Learn strategies for improving scholastic and domestic interpersonal relationships:*	*Learn about facing the main transition changes:*	*Learn about organizing daily activities:*	*Learn about sexual education and management:*
	High Functioning Social conversation, conversation content, conversation exchange, reciprocity, turn	**High Functioning** Personal care; hygiene, food, danger perception; room/ house care; self sufficiency in transports; money value	**High Functioning** Differences in the interaction with a well-known person and a stranger; friendship; relations with the opposite sex	**High Functioning** Facing physical, psychological, environmental change (social expectations, school, healthcare services); diagnosis awareness	**High Functioning** School, university, job, recreational activities, sport, art, music	**High Functioning** Privacy, sexual behavior, masturbation, romantic social skills, having a romantic relations, sexual intercourse, ethical concerns
	Low Functioning Integration of verbal and nonverbal strategies, social requests	**Low Functioning** Personal care; hygiene; food; danger perception; room/ house care	**Low Functioning** Identification of a stranger compared to a well-known person; friendship; improving social activities/games	**Low Functioning** Family awareness of transition physical, psychological, environmental changes (social expectations, school, healthcare services) and challenges	**Low Functioning** School, protected job environment, practical activities (i.e. gardening, cooking…) sport, art, music	**Low Functioning:** Preivacy, sexual behavior, masturbation, touching and being touched in an appropriate manner

3.2. Paired differences between T0 (pre-intervention) and T1(post intervention)

3.2.1. Paired differences in adaptive functioning

A significant improvement in all the ABAS II adaptive domains (GAC $M \pm SD$ = -7.94 ± 12.25 p = .017; CAD $M \pm SD$ = -8.88 ± 14.99 p = .027; SAD $M \pm SD$ = -8.17 ± 12.48 p = .016; PAD $M \pm SD$ = *-8.64 ±13.39* p = .017) emerged at T1, after 6 months of training (Table 2).

3.2.2. Paired differences in parental stress

A significant reduction of parental stress was found after the online training in two subscales: PSI-DC (Difficult Child) ($M \pm SD$ = 15.23 ± 22.05; p = .012) and Total ($M \pm SD$ = 20.00 ± 5.70; p = .003) (Table 2). Whereas, PSI-PD (Parental Distress $M \pm SD$ = 5.94 ± 37.78; p = NS) and PSI-PCDI (Parent/Child Difficult Interaction $M \pm SD$ = 5.47 ± 21.28; p = NS) did not report significant differences at T1.

Table 2

Paired Differences between T0 (baseline) and T1(after 6 months of TrASDition Training). ABAS-II = Adaptive Behavior Assessment System, Second Edition; GAC = General Adaptive Composite score; CAD = Conceptual Adaptive Domain;; SAD = Social Adaptive Domain; PAD = Practical Adaptive Domain; PSI-SF = Parental Stress Index Short Form; PD = Parental Distress; PCDI = Parent-Child Dysfunctional Interaction; DC = Difficult Child; PSI-SF Tot = Parental Stress Index Short Form Total Score; * = significant value; NS= non-significant value

	Mean Difference T0-T1 (M±SD)	*t*	*p value*
ABAS-II_GAC T0-T1	-7.94 ±12.25	-2.67	**.017***
ABAS-II_CAD T0-T1	-8.88 ± 14.99	-2.44	**.027***
ABAS-II_SAD T0-T1	-8.17 ± 12.48	-2.70	**.016***
ABAS-II_PAD T0-T1	-8.64 ± 13.39	-2.66	**.017***
PSI-SF_PD T0-T1	5.94 ± 37.78	.648	NS
PSI-SF_PCDI T0-T1	5.47 ± 21.28	1.06	NS
PSI-SF_DC T0-T1	15.23 ± 22.05	2.84	**.012***
PSI-SF_Tot T0-T1	20.00 ± 5.70	3.50	**.003***

When considering the sample as dichotomized in significantly Clinically Stressed (CS) (≥90° for PD, DC, Total; ≥85° for P-CDI) or Non Clinically Stressed (NCS), no significant results emerged (PD p = NS; PCDI p = NS; DC p = .250; Tot p = 0.063).

However, even if no significant results emerged, at T1, we observed a decrease in the number of parents reporting a significant level of parental stress in almost all the PSI-SF subscales, except for the PD

Table 3

Crosstabulation: Variation of the number of Clinically Stressed Parents after the TrASDition Training After dichotomizing the sample in Clinically Stressed (CS) (≥90° for PD, DC, Total; ≥85° for P-CDI) or Non Clinically Stressed (NCS), no significant results emerged ((PD p = NS; PCDI p = NS; DC p = .250; Tot p = 0.063). However, we observed a decrease in the number of parents reporting a significant level of parental stress in almost all the PSI-SF. Shown in the table, the variation of the number of Parents with Clinical Stress (CS) at T1, PSI-DC: decrease of CS parents from 9 to 6 PCDI: decrease of CS parents from 10 to 9 PD: no variation in the number of CS parents (2 =2) PSI Tot: global reduction of CS parents from 8 to 3 PSI-SF = Parental Stress Index Short Form; PD = Parental Distress; PCDI = Parent-Child Dysfunctional Interaction; DC = Difficult Child; PSI-SF Tot = Parental Stress Index Short Form Total Score.

Variation of the Number of Clinically Stressed Parents after the TrASDition Training			
	PSI_T1		
	No Clinical Stress	*Clinical Stress*	*Total*
PSI_ DC _T0			
No clinical stress	8	0	8
Clinical stress	3	6	**9**
Total	11	**6**	17
PSI_PCDI_T0			
No clinical stress	7	0	7
Clinical stress	1	9	**10**
Total	8	**9**	17
PSI_PD_T0			
No clinical stress	13	2	15
Clinical stress	2	0	**2**
Total	12	**2**	17
PSI_TOT_T0			
No clinical stress	9	0	9
Clinical stress	5	3	**8**
Total	14	**3**	17

(Table 3). In particular, regarding PSI-DC, at baseline, 9 parents fell in the category CS, whereas at T1, 3 of them were no more clinically stressed.

Concerning PSI-PCDI, only 1 parent who resulted as CS at baseline, turned into NCS after 6 months of training. Finally, in regards to PSI-TOT, a decrease of 5 CS parents emerged. However, in the PSI-PD subscale, the number of CS parents remained stable at the end of the study.

3.2.3. Paired differences in repetitive and problematic behavior

Concerning repetitive and aberrant behaviors, no significant results emerged between baseline and after 6 months of treatment.

4. Discussion

In this study, we investigated the efficacy of an online not individualized psychoeducational training addressed to parents of autistic youth with and without ID during the transition to the young-adult age.

According to our hypothesis, after 6 months of Training, we found a significant improvement in adaptive functioning of ASD participants and a reduction of parental stress. Instead, no significant decrease of repetitive and problematic behavior emerged in this study.

Our findings are consistent with the literature showing that the family inclusion in a transition program is positively related to a better functioning of the autistic person and to a reduced parental stress (Smith et al., 2014; DaWalt et al., 2017).

In regards to the adaptive functioning, all the investigated domains (conceptual, practical, social, general) resulted as bettered after the psychoeducational intervention. Given the fact that most of the training topics were directly or indirectly focused on adaptive skills and on the necessary strategies to improve them, this result was expected.

To our knowledge, no previous studies specifically investigated the whole adaptive functioning as a main outcome measure of a parental transition training. In fact, most of the researches focused on the possible improvement of self-determination and expectations for the future (Hagner et al., 2012; Hatfield et al., 2017; White et al., 2019) except for Da Walt et al., (2017). The authors investigated and found an improvement of the social functioning, measured by SRS scale (Social Responsiveness Scale), after an 8 week program multifamily group (*Transitioning Together*), conducted in person on 45 adolescents and their parents. However Da Walt et al. (2017) did not look at the other areas of adaptive functioning. Whereas, we employed the ABAS-II scale which provides a measure of all the adaptive domains (i.e. communication, social, healthcare, school, home).

It is well known that, the deficit in functional skills is related to a worst later outcome (Seltzer et al., 2004; Shattuck et al., 2012; Howlin et al., 2012; Kirby et al., 2016; Postorino et al., 2015), and that, in adult life, ASD individuals show a gap between cognitive skills and adaptive functioning, to the detriment of the latter (Kraper et al., 2017). Moreover, youth daily functioning skills, together with parental participation in special education, have been recently considered as positive predictors of post-school employment success for autistic individuals (Wong et al., 2020).

In this regard, the need of developing strategies to improve adaptive skills, also in later life, has risen within ASD (Kraper et al., 2017; Smith et al., 2012). Therefore, we suggest that a parental training focused on adaptive skills, as TrASDition Traning is, may be rather helpful in improving outcome in adultlife.

Concerning parental stress, interesting findings emerged in our study. First of all, as suggested by Da Walt et al (2017), we employed a specific instrument for assessing the stress of parents (PSI-SF) and not a test which gives a measure of general life stress. This choice of instrument permits to obtain specific stress profiles regarding not only the parent himself (PSI-PD) but also parental feelings related to the interaction with the child (PSI-PCDI) and the management of their child's behaviors (PSI-DC).

In particular, after the training we found a decrease within PSI-DC (Difficult Child) and PSI-Total subscales. Of particular interest, higher scores on PSI-DC, at baseline, are considered suggestive of a parental necessity of acquiring strategies to handle challenging behavior (Abidin, 1995). Therefore, our significant finding of an improvement pointedly in this subscale at T1, demonstrates the psychoeducational intervention's effectiveness in reducing parental difficulties in managing their child behaviors.

Whereas, the PSI-PCDI and PSI-PD subscales, which are more focused on parental perception of competence in the role of a parent and on their feeling of satisfaction with their child, did not emerge as improved. This lack of improvement may be explained by the necessity of a longer period of psychoeducational intervention in order to modify these stressful aspects due to parenting.

Furthermore, specifically looking at the number of parents defined as clinically stressed before and after the training, even if significant results did not emerge, probably due to sample size, we observed a parents' number decrease in almost all the PSI-SF domains. These results on parental stress, as a whole, are suggestive of TrASDition Training effectiveness in reducing the stress related to parenting, especially in regards to the interaction with the child and managing maladaptive behaviors.

The lack of improvement in repetitive and problematic behaviors that emerged in our study, can be explained by the fact that the video lessons were less specifically centered on repetitive and aberrant behaviors. Moreover, these types of behaviors necessitate of intensive intervention in order to be improved because of their being pervasive and hard to modify (Harrop, 2015; Lin et. al., 2018; Mazza, et al. 2020). Furthermore, an individualized intervention focused on these atypical behaviors, could be more effective in reducing restricted and repetitive behaviors rather than a general training.

However, even if significant reduction of these challenging behaviors was not captured by RBS-R and ABC-C scales, we found that, following the intervention, parents referred less difficulties in managing them. In fact, after the training, parents reported lower scores on PSI-SF DC subscale - which specifically measure this aspect - as previously reported. This result is consistent with Smith et al (2012) study, who found an improved ability of parents to predict a maladaptive behavior of their child.

Main strengths of this study are represented by: the online approach of the intervention; the longitudinal assessment after 6 months of intervention, using standardized outcome measures (Kirby, 2020); the inclusion of ASD participants with ID.

Nevertheless, even if the online approach enhances accessibility for many families, we consider it as a complementary intervention and not a replacement of in-person training or psychoeducative groups which offers the possibility of direct interaction between therapist and participants.

Several limitations characterize our research: poor female sex representation; the lack of a control group not undergoing the Parental Training, non individualized modules; the lack of comparison between groups with and without comorbid Intellectual Disability, due to small sample size. Further studies on wider representative samples and with a control group, are necessary in order to confirm the effectiveness of the TrASDition Training.

5. Conclusions

TrASDition training represents a promising and innovative program to support families of youth with ASD during the transition to adult life. The online approach could, in fact, provide easy access to services which otherwise will burden a daily organization already strenuous for a family with an autistic person. Furthermore, given the actual lack of integrated healthcare systems for autistic adults, enhancing parental skills could represent a feasible program to improve skills preparatory for transition in adult life.

CRediT authorship contribution statement

Siracusano Martina: Methodology, Data curtion, Writing – original draft. **Calsolaro Jonathan:** Data curtion, Resources. **Riccioni Assia:** Methodology, Visualization, Resources, Investigation. **Gialloreti Emberti Leonardo:** Formal analysis. **Benvenuto Arianna:** Resources, Investigation. **Giovagnoli Giulia:** Resources, Investigation. **Curatolo Paolo:** Supervision. **Mazzone Luigi:** Conceptualization, Methodology, Supervision, Writing – review & editing.

Declaration of Competing Interest

The authors declare they have no competing interests.

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