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Short report. Cooking for autism: a pilot study of an innovative culinary laboratory for Italian adolescents and emerging adults with autism spectrum disorder

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ABSTRACT

Background: Adolescence and emerging adulthood are critical periods for young people with autism spectrum disorder (ASD). However, there is a lack of appropriate and affordable services available.
Aims: The Il Tortellante® is an Italian project aimed at promoting adaptive behavior and social skills, and at reducing the severity of symptomatology through a culinary group intervention in which young people with ASD learn to make fresh pasta by hand.
Methods: A longitudinal study was conducted.
Procedure: Before and after the intervention, 20 participants were assessed based on the severity of symptoms, social skills, and adaptive behaviors.
Outcome and results: According to our findings, severity of symptoms and daily living skills improved significantly.
Conclusion: A culinary intervention may be useful for adolescents and young adults with ASD to improve daily living skills and reduce ASD-related symptomatology.
Implication: Services and associations may consider developing a culinary laboratory for people with ASD to improve group intervention proposals for adolescents and emerging adults.
What this paper adds?: This paper offers one of the first investigations of the impact of a culinary laboratory on ASD symptoms, social skills, and adaptive behavior in adolescents and young adults diagnosed with ASD. This group intervention could contribute to expand the range of

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interventions targeted at adolescents and young adults with ASD, to reduce the severity of symptoms, and to promote adaptive behaviors.

1. Introduction

Autism spectrum disorder (ASD) is a lifelong neurodevelopmental condition characterized by impairment in social communication, interaction, and adaptive behaviors, and by the presence of restricted interests (American Psychiatric Association, 2013). The management of this condition has a significant impact on the quality of life of individuals and their families, as well as substantial direct and indirect economic costs (Buescher, Cidav, Knapp, & Mandell, 2014). The standard-of-care therapy for ASD often entails intensive behavioral and educational therapy, with many patients requiring lifelong care, which results in significant costs (Cakir, Frye, & Walker, 2020). Specifically, education, care, and management of comorbidities are major contributors to direct medical costs. Families with ASD individuals even experienced significantly higher levels of deprivation and unemployment, resulting in financial hardship and poverty (Bieleninik & Gold, 2021).

Adolescence and emerging adulthood are critical periods for young people with ASD. Indeed, they frequently experience poor transition outcomes, including unemployment, limited participation in postsecondary education, low rates of independent living, and difficulties in forming social relationships (Lounds Taylor et al., 2012). Interestingly, social difficulties are associated with fewer peer relationships and lower participation in recreational activities, both of which have been linked to lower psychological well-being (Whitehouse, Durkin, Jaquet, & Ziatas, 2009).

Most people with ASD require help throughout their adolescence and adulthood (Elias & White, 2018). Indeed, they display impairments in adaptive behaviors that encompass those behaviors critical to living independently, for example, daily living (e.g., dressing and grooming), social, and communication skills (Tomanik, Pearson, Loveland, Lane, & Bryant Shaw, 2007). However, there is a lack of appropriate services available to this population as they transition to adulthood (Lake, Perry, & Lunsky, 2014). This transition is frequently accompanied by a loss of entitlement to services such as formal school support. As a result, young people with ASD and their families are left with unmet needs, and they manage the transition process mainly on their own. The quality and accessibility of services for adults and transitioning adolescents with ASD must be improved, and interventions are required to support these individuals in developing and consolidating adaptive behaviors and social skills, and their families in managing of this condition (Lounds Taylor et al., 2012).

Among the interventions for ASD, occupational therapy (OT) has a prominent role in promoting engagement and participation in meaningful and purposeful activities (Mandich & Rodger, 2006). OT could play a critical role in addressing the wide range of difficulties faced by people with ASD: daily living activities, work, leisure, play, and social activities. OA offers a wide range of activities, including manual activities, creative activities such as horticulture and gardening (Malhotra, 2019; Scartazza et al., 2020; Schweizer, Knorth, van Yperen, & Spreen, 2020). However, among the many activities, there is limited evidence related to the practice of cooking in individuals with ASD. A few studies assessed the impact of culinary workshops in improving the nutritional status and reducing unhealthy eating behaviors of participants (Barnhart, Havercamp, Lorenz, & Yang, 2019; Buro et al., 2021; Goldschmidt & Song, 2017). On the other hand, there are no studies that evaluated the impact of a culinary intervention on the severity of symptomatology, adaptive behaviors, and social skills.

Il Tortellante® is an innovative project focused on adolescents and young adults with ASD started in 2016. It includes culinary interventions based on the handmade production of fresh pasta to help ASD young people practice social and communication skills, as well as daily living skills.

This study was aimed at evaluating the effects of *Il Tortellante*® project on participating adolescents and young adults diagnosed with ASD. More specifically, the study evaluated changes in adaptive behaviors, social skills, and severity of ASD-related symptomatology.

2. Materials and methods

2.1. Participants

Twenty patients were recruited as participants in *Il Tortellante*®. Participants and their caregivers were informed about the research protocol and the legal guardians of participants provided their informed consent. The following inclusion criteria were used to enroll participants in the study: age between 15 and 25 years; ASD diagnosed according to the Autism Diagnostic Observation Schedule (ADOS) or ADOS-2nd Edition (ADOS-2) (Gotham, Risi, Pickles, & Lord, 2006; Lord, Rutter, DiLavore, Risi, & Gotham, 2012) or according to the criteria of the Diagnostic and Statistical Manual of Mental Disorders - Fifth Edition (American Psychiatric Association, 2013). Exclusion criteria included the presence of a previously identified genetic disorder resulting in a phenotype similar to ASD, and a history of medical or behavioral conditions making participation harmful for the patients.

The mean age of participants was 19.3 ± 3.58. Three patients had ADOS score 1, eleven had ADOS score 2, and six had ADOS score 3.

All protocols applied in this research complied with the requirements specified in the Declaration of Helsinki of 1975 and subsequent revisions.

2.2. Procedure

A pre-post design study was performed. Data were collected at the start of the project in September 2018 (pre-test) and after the intervention in April 2021 (post-test). Activities were discontinued from March 2019 to May 2020 due to the SARS-CoV-2 pandemic.

2.3. Measures

Participants were scheduled for an initial assessment. Characteristics of the participants such as age, gender, diagnosis and verbal ability were obtained. A semi-structured interview with the parents of the participants was conducted by a psychologist to assess skills and abilities with the goal of designing a personalized intervention.

Then, the following measures were completed by a consistent caregiver with the supervision of a psychologist before and after the intervention phase.

2.3.1. Severity of ASD symptoms

The Childhood Autism Rating Scale, Second Edition (CARS-2) assesses the severity of ASD symptoms based on 15 items allowing adequate measurement of overall functioning. We used the Italian validation of the CARS-2 which shows good psychometric properties in line with the original version (Rellini, Tortolani, Trillo, Carbone, & Montecchi, 2004).

2.3.2. Social impairments

The Social Responsiveness Scale (SRS) (Constantino, 2002) is a 65-item rating scale measuring social impairments in ASD. It comprises five subscales, namely Social Awareness, Social Cognition, Social Motivation, Social Communication, and Autistic Mannerisms. The SRS has high internal consistency and retests temporal stability in males and females.

2.3.3. Adaptive behaviors

The Vineland Adaptive Behavior Scale II (VABS II) (Sparrow, Cicchetti, & Balla, 2005) was used to measure adaptive behaviors. Adaptive behavior refers to the skills needed by individuals to function and be self-sufficient in daily life. This scale is a measure of communication, daily living skills, socialization, and motor skills.

2.4. Intervention

Each patient participated in individual training sessions prior to the intervention under the supervision of a psychologist and a registered behavior technician. The training sessions were focused on teaching the skills and procedures required to complete fresh pasta production with minimal assistance from occupational therapists.

Our culinary interventions also promoted cooperation and participation in social interactions. Occupational therapists, psychologists, and volunteers supervised task completion and facilitated interaction among participants. Patients were divided into groups including six patients per group in the morning and four in the afternoon. Depending on the severity of the symptoms, the ratio of healthcare professionals to patients ranged from 1:1–1:4.

Patients were required to attend the program five days a week, for a total of 3–6 h per day, depending on their academic commitments. A typical workshop day begins with a welcome and preparation phase at 9.00 a.m. The fresh pasta production phase begins after each participant is assigned a specific task. The morning session ends at 15.00 with laboratory cleaning and organization. The afternoon session begins at 4:00 p.m. and ends at 7:00 p.m. for patients who go to school in the morning. Fresh pasta production included individual and group tasks. The TEACCH approach was used to organize the laboratory environment using images and tools. According to the ABA method, techniques such as shaping, fading, modeling, prompting, chaining, token economy, and task analysis were used. A personalized educational program was created for each patient. Overall, objective of the intervention is to increase adaptive behaviors while reducing social impairments and ASD-related symptoms.

Additional therapeutic and rehabilitation projects with various goals have been carried out alongside the fresh pasta production laboratory:

1. the Shopping project, in which patients learned to manage the laboratory pantry by checking the products on a regular basis and creating a shopping list with the missing items.
2. the Money Project, in which patients were taught how to manage money in a safe environment through role play in order to learn to pay at the supermarket.
3. the Social Skills Training Project aimed at teaching patients the fundamentals of interpersonal communication and to practice social and communicative behaviors in a group setting.
4. the Emotions project, in which patients learn to recognize the characteristics of primary emotions and understand when they are activated in their daily lives.
5. the Apartment project, in which patients were provided with a common area where they could spend the weekend independently under the supervision of ABA-trained psychologists and therapists to promote activities of daily living, increase basic autonomy, improve socialization skills and manage run a house.

2.5. Statistical analysis

Data are described as mean and standard deviation or median and range for continuous variables and as absolute and relative frequencies for categorical variables. Nonparametric analysis (i.e., Wilcoxon signed-rank test) for continuous variables was used to measure differences at pre-test and post-test. Statistical significance was set at $p < 0.05$; all p-values were based on two-tailed tests. Statistical analysis was performed using SPSS for Windows.

3. Results

The average age was 19.3 years ± 3.58. Eleven of the 20 participants were able to speak, while nine patients were non-verbal. The average CARS 2 score at pre-test was 35.07 ± 8.16. According to CARS 2 rating scale, three patients had a mild symptom severity, eight moderate symptom severity, and nine severe symptoms severity. At post-test, the average score was 32.42 ± 7.87, with a statistically significant improvement (p = 0.007). Infour patients, symptom severity regressed from moderate to mild.

The SRS average score at pre-test was 75.65 ± 12.56. Two patients had mild social impairment, eight moderate social impairment, and the remaining ten had severe social impairment. The average score at post-test was 74.8 ± 12.33. There was no statistically significant difference between SRS total scores at pre-test and at post-test ($p = 0.409$) but in two patients severe social impairment regressed to mild social impairment.

Although no statistically significant improvement was found in Social Awareness, Social Cognition, Social Communication, Social Motivation, Restricted Interests, and Repetitive Behavior, a positive trend can be observed, especially in the Social Cognition domain.

The Composite Scale average score of the Vineland II at T0 was 22.25 ± 8.72, with all the patients in the low score range. The VABS-II Communication Scale average score was 25.45 ± 16.49, the VABS-II Daily Living Skills average score was 37.4 ± 16.32, and VABS-II Socialization Scale average score was 26.55 ± 10.89. At post-test the Composite Scale average score was 22.35 ± 6.72. No statistically significant difference was found between pre-test and post-test scores. Concerning the single domains at post-test, Communication Scale average score was 27.5 ± 15.88, with no statistically significant difference. The Daily Living Skills Scale average score was 42.95 ± 17.1, with a statistically significant improvement atthe post-test (p = 0.041). Finally, the Socialization Scale average score at post-test was 26.65 ± 11.79, withno statistically significant difference. Single scale scores are reported in Table 1.

4. Discussion

The objective of this study was to explore changes in adaptive behaviors, social skills, and severity of ASD-related symptomatology in adolescents and young adults with ASD following participation in the *Il Tortellante*® project. Our results showed a significant improvement in the severity of symptoms and daily living skills. However, no statistically significant improvement was shown in social impairments and adaptive behaviors in the domains of socialization and communication. We inferred that the long interruption caused by the COVID-19 pandemic may have influenced the results. Due to the social distance created by the pandemic, both ASD children and their families were unable to receive in-person support from their therapists and to participate in external therapies. Changes in routine, increased social isolation, and lack of connectedness are also important factors that may have had a negative impact on the overall functioning of people with ASD.

In the literature, interventions have been described supporting self-management and the development of daily living skills in ASD adolescents with a primary focus on living skills such as grooming, cleaning, and job-related tasks aimed at supporting the transition to adulthood. However, the impact of cooking interventions on ASD symptoms has never been evaluated. Interestingly, our results suggest that a culinary laboratory might be a useful activity to include in the range of interventions for adolescents and young adults with ASD.

Patients participating in the *Il Tortellante*® project, could also gain real-world experience by selling their products, contributing to the laboratory's financial sustainability in work-related environment. This particular aspect was not measured in our study, however

Table 1
Mean and SD score at t0 and t1.

	Mean ± SD (Pre-test)	Mean ± SD (Post-test)	*p*
CARS-2	35.07 ± 8.17	32.42 ± 7.87	**0.007**
SRS Total Score	75.65 ± 12.56	74.8 ± 12.33	0.409
SRS Social Awareness	62.9 ± 18.26	61.5 ± 17.27	0.687
SRS Social Cognition	76.85 ± 11.33	73.7 ± 12.55	0.058
SRS Social Communication	71.65 ± 14.48	68.55 ± 15.43	0.836
SRS Social Motivation	71.2 ± 14.79	66.05 ± 10.45	0.116
SRS Restricted Interests and Repetitive Behavior	80.35 ± 12.27	79.3 ± 11.68	0.733
VABS-II Composite Scale	22.25 ± 8.72	22.35 ± 6.73	0.914
VABS-II Communication	25.45 ± 16.39	27.5 ± 15.89	0.345
VABS-II Daily Living Skills	37.4 ± 16.33	42.95 ± 17.1	**0.041**
VABS-II Socialization	26.55 ± 10.89	26.65 ± 11.79	0.858

Note. CARS-2: Childhood Autism Rating Scale, Second Edition; SRS: Social Responsiveness Scale; VABS-II: Vineland Adaptive Behavior Scale II; SD: standard deviation

future studies could evaluate whether participation in work-related experiences could foster future job placement.

Limitation of our study are the small sample size and the absence of a control group. In addition, future research could be useful to determine which factors are linked to better outcomes (e.g., sex, age, level of functioning) and assess how participants interact with one another within the group. Another major limitation is represented by the variability in the execution of assigned tasks, since they were tailored to each patient. However, we believe that a flexible approach to tasks and activities in subjects with ASD could be more useful and ecologically valid (Crawley et al., 2020).

5. Conclusion

In our patients, regression of the symptom severity and improvement in daily living skills suggests that a culinary laboratory that combines work and social participation could be an interesting approach to improve the quality of life of ASD patients.

Declaration od Competing Interest

The authors have no conflicts of interests to declare, that may be affected by the publication of the paper. Other conflicts of interests are as follows: GP research is supported by Takeda, Jazz Pharmaceuticals, Bioproject, Idorsia.

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