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Reduced Inter-variability of Psychopathological Traits within Families of Adolescents with Anorexia Nervosa

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Abstract

Background: While substantial research focuses on the psychological characteristics of adolescents with Anorexia Nervosa (AN), little is known about the psychopathological profiles of their parents, especially of the fathers. Therefore, this study aims to investigate the psychopathological profiles of AN adolescents and their parents compared with a control group.

Methods: This observational case-control study involved 94 families of adolescents aged 12 to 17: 47 families diagnosed with AN were matched with 47 control families. The sample mean is 15.9 with a standard deviation of 2.9 for BMI across the AN group. Inclusion criteria included adolescents aged 12 to 17 with a diagnosis of AN, and both parents available for the study. Exclusion criteria included AN secondary to medical conditions, severe psychotic disorders, intellectual disabilities, or insufficient understanding of the Italian language. The Symptom Checklist 90–Revised (SCL-90-R) assessing psychopathological symptoms in adolescents and their parents was administered. Statistical analyses compared SCL-90-R scores between AN and control groups and assessed inter-variability within the AN family.

Results: Adolescents with AN and their parents displayed significantly higher SCL-90-R scores than controls across multiple dimensions. Specifically, mothers of AN adolescents exhibited higher scores on depression and psychoticism scales, while fathers exhibited higher psychoticism, total positive symptoms, and positive symptom distress. Notably, AN family showed reduced inter-individual variability in psychopathological profiles compared to controls, both within dyads (adolescent-mother, adolescent-father) and the entire family.

Conclusion: This study highlights distinct psychopathological profiles in AN family and suggests potential factors of illness maintenance related to parental psychopathology. The findings emphasize the importance of involving the entire family, including fathers, in the therapeutic process for adolescents with AN. Further research with larger samples and structured interviews is needed to validate these results and expand our understanding of family involvement in AN psychopathology.

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1. Introduction

Anorexia Nervosa (AN) is a serious psychiatric disorder with a substantial peak in incidence in adolescence, a high mortality rate, and multiple medical and psychiatric comorbidities (Zipfel et al., 2015). AN, as well as eating disorders in general, significantly impact not only the individual but the family system as well (Martin et al., 2011, Riva et al., 2024). Eating behavior - especially in its psychopathological aspects - has been related to family dynamics and functioning (Minuchin et al., 1978, Selvini Palazzoli et al., 1998). Research dating back to Bruch (1958) first illustrated the critical role of family dynamics in the development of AN, proposing that conflicts over autonomy and independence were central themes in these families. This perspective was further supported by Selvini Palazzoli (1974) who noted that AN could be seen as a struggle for control within the family, an idea that has been substantiated in numerous studies over the decades (Palazzoli, 1978; Minuchin et al., 1978).

Although there is significant literature on the characteristics of the psychological functioning of adolescents with AN, little is still known about the psychopathological characteristics of their parents. This aspect acquires more importance because it is well-recognized that family relationships may either contribute to AN development/maintenance (Guiducci et al., 2018, Schmidt & Treasure, 2006, Treasure & Schmidt, 2013) or are seriously affected by the AN onset (Treasure & Nazar, 2016).

In more recent times, research has continued to underscore the influence of familial relationships on the course of eating disorders and how early interventions in family systems could mitigate the progression of the illness (Smith et al., 2021). Research demonstrated that interventions involving family members significantly improve recovery rates in adolescents with AN, highlighting the transformative role that family therapy has assumed in treatment paradigms over recent decades (Couturier et al., 2019). In 2022, Johnson and colleagues highlighted the cyclical nature of these impacts, where parental psychopathology can both precede and be exacerbated by a child's diagnosis of AN, suggesting a bidirectional relationship between patient and caregiver psychopathologies. To these aspects, it should be added that caregivers of patients with eating disorders usually experience a heavy caregiving burden, and are at risk of having poor mental health status (Ohara et al., 2016; Rhind et al., 2016), which may contribute to the maintenance of the disorder.

Adolescents with AN show psychopathological asset characterized by obsessions-compulsions, interpersonal sensitivity, depression, hostility, and occasionally psychoticism (from mild interpersonal alienation to full-blown psychotic experience) (Marucci et al., 2018, Mensi et al.,

2020, Tafâ et al., 2017). Similarly, literature on parents of adolescents with AN shows a psychopathological profile that includes depressive, obsessive-compulsive, and anxious symptoms, as well as elevated levels of somatization and hostility (Tafâ et al., 2017, Zabala et al., 2009). A recent meta-analysis (Fernando et al., 2022) further validates these observations, establishing strong relations between parental anxiety disorders and the prevalence of eating disorders in offspring, underlining the necessity for integrated family therapy in treatment plans. In this vein, research shows an association between the psychological functioning adolescent of eating disorders adolescents and the psychopathological functioning of parents (Sellers et al., 2013). A 2022 study by Van den Berg and colleagues provided compelling evidence linking specific parental psychopathological patterns with increased severity of eating disorders in children, suggesting that parental anxiety and depression are predictive of poorer outcomes in family-based treatments (Van den Berg et al., 2022).

Most of these studies addressed associations between maternal psychopathology and/or psychopathological risk (e.g., depression, anxiety symptoms, eating disorders) and the occurrence of eating disorders in female adolescents (Haycraft et al., 2014, Striegel-Moore et al. 2005). Furthermore, it has been shown that the psychopathological functioning of parents, and especially maternal, is associated with the psychological functioning of the adolescent (Isnard et al., 2010), while there is a shortage of research on paternal psychopathological risk and its role in promoting eating disorders in their daughters (Berge et al., 2010). Only recent works outlined that fathers showed lower levels of general psychological distress, depression, anxiety, and eating disorder-related burden and lower emotional over-involvement compared to mothers (Tafâ et al., 2019, Zeiler et al., 2009). Additional insights from Harper et al. (2023) on paternal involvement in the therapeutic processes highlight potential benefits that have been underexplored in traditional treatment models focused predominantly on mothers. Further, both parents' health seems to be influenced by the duration of the eating disorder, suggesting that caring is a major stressor for the family especially when a severe clinical and psychiatric condition is maintained for a prolonged period (Stefanini et al., 2019).

Recent studies have emphasized the importance of psychological resilience and the innovative use of machine learning analyses in understanding the broader psychopathology of eating disorders. Beroš et al. (2021) and Orru et al. (2021) have both contributed significantly to this field, highlighting how these methodologies can provide new insights into traditional psychological evaluations and treatment approaches, which could be particularly beneficial in complex familial interactions seen in disorders like AN.

The research on fathers, although still limited, suggests that the psychopathological profiles of parents of adolescents with AN exhibit specific peculiarities and significant analogies with the psychological profiles of their sons/daughters. This observation has profound implications for clinical practice as understanding these parental psychopathological traits - and their potential connection to the traits of their children - could critically inform the direction and focus of therapeutic interventions.

Therefore, we hypothesize in this study that similar psychopathological profiles between parents and adolescents with AN may indicate a familial pattern of coping mechanisms or shared stress responses that contribute to the maintenance and potentially the genesis of the disorder. Such familial resemblances could stem from genetic predispositions, shared environmental factors, or learned behaviors within the family system. This mirroring in psychopathology not only highlights the interdependence of family members' mental health but also underscores the need for a holistic approach to treatment that addresses the dynamics of the entire family rather than the individual alone. Additionally, our study aims to explore the role of fathers in these dynamics more closely. Previous research has predominantly focused on mothers, partly due to traditional caregiving roles; however, recent studies suggest that fathers' emotional and psychological involvement - or lack thereof - can significantly influence the family's overall ability to manage and recover from the disorder. By comparing the psychopathological profiles between fathers and mothers, and examining the inter-variability of these profiles within family dyads (adolescent-mother, adolescent-father) and the entire family unit, we aim to uncover whether the psychopathological functioning of fathers is as pivotal to the familial disorder dynamics as hypothesized.

Therefore, the specific aims of the study are:

1. **Comparison of Psychopathological Profiles:** To compare the psychopathological profiles between adolescents with AN and their parents and align our findings with existing literature.
2. **Evaluation of Inter-Variability:** To assess the inter-variability of psychopathological profiles within dyads (adolescent-mother, adolescent-father) and across the whole families of adolescents with AN to determine if similarities in psychological functioning support our hypotheses about familial dynamics.

2. Materials and Methods

This observational case-control study involved a sample of 94 families of adolescents aged 12 to 17 divided into a clinical group of 47 families who were admitted to the Eating Disorder Unit at the Department of Child Neuropsychiatry, XXX for AN diagnosed according to DSM-5 criteria, and a control group of 47 families matched for age and socio-economic status. The control group was recruited from a community through advertisements in schools and snowball sampling in a suburban neighbourhood of an Italian city in the northwest of Italy. All AN adolescents show a diagnosis of restrictive AN.

Inclusion criteria were: (1) adolescents aged 12 to 17 years; (2) for the clinical group, a confirmed diagnosis of AN as per DSM-5 criteria, and, for the control group and for parents of both groups, a negative medical history for known psychiatric disorders; (3) availability and consent of all adolescents and parents to participate in the study.

Exclusion criteria for the clinical group included any case of AN secondary to medical conditions and for all participants with intellectual disabilities and insufficient understanding of the Italian language.

2.1 Measures

The Demographic Information is a questionnaire created to evaluate age, gender, weight, height (to calculate the Body Mass Index (BMI) because anorexia is diagnosed with a BMI equal to or less than 17), family socioeconomic status (low income < 15000 €/y, medium income from 15000 to 36000 €/y and high income > 36000 €/y) and family composition (number of components) of participants.

The Symptom Checklist-90–Revised (SCL-90; Derogatis & Savitz, 1999; Prunas et al., 2012) is a self-report questionnaire designed to assess psychological problems and psychopathological symptoms in individuals 13 years and older. This original measure, as well as the validated Italian version that we used, consists of 90 items rated on a 5-point Likert scale that assesses nine symptom dimensions (somatization [SOM], obsessive-compulsive [OC], interpersonal sensitivity [INT], depression [DEPR], anxiety [ANX], hostility [HOS], phobic anxiety [PHOB], paranoid ideation [PAR], psychoticism [PSY]). The SCL90-R test also provides 3 indexes: General Symptomatic Index (GSI), which discriminates subjects at high risk of psychiatric disorder and in a psychopathological condition; Positive Symptom Total (PST), which corresponds to the number of symptoms checked; Positive Symptom Distress Index (PSDI), a ratio between the sum of all items and the PST. For each index, scores between 55 and 65 are

considered borderline, higher than 65 pathological. In this study, we administered the questionnaire to adolescents and both parents. The Italian version (Derogatis & Savitz, 1999; Prunas et al., 2012), used in this research, shows good internal coherence for all subscales (α values between 0.70 and 0.96).

2.2 Procedures

This study was part of a larger research project investigating family and individual characteristics in AN adolescents. Parents and adolescents were told the purpose of the study and were informed of their right to withdraw from the research at any time. Both gave written informed consent to participate in it. The study was approved by the ASST Brianza Ethics Committee and the Ethics Committee of the Department of Educational Sciences, University of Genova. All the procedures were consistent with the principles of the Declaration of Helsinki (1964) and its later amendments. Data collected were processed in accordance with Italian Legislative Decree 196/2003 and the GDPR UE 2016/679.

2.3 Data Analysis

Given the observational nature of the study and the constraints associated with available data, a retrospective power analysis was conducted justifying the sample size of the study. Before conducting the main analyses, descriptive statistics and internal consistency coefficients were computed for study variables. The normality of the distribution was assessed using skewness, kurtosis, and visual inspection. Considering potential multicollinearity among subscales originating from the same questionnaire set, significance thresholds were adjusted to $p < 0.004$. Non-parametric tests were used for non-homogeneous variance testing. The Mann-Whitney U Test and Independent Kruskal-Wallis Test were employed to compare SCL-90-R scores between groups and within family members. Despite the gender imbalance, statistical adjustments were made by including gender as a covariate to mitigate potential confounding effects, allowing for a more reliable assessment of psychopathological differences between groups. We considered including regression analysis to explore predictive relationships within our data. However, we opted for descriptive and inferential statistics to avoid potential multicollinearity issues and ensure the reliability of our findings. This focused approach enhances the clarity and applicability of our results in clinical contexts. IBM SPSS 28 software was utilized for the analyses.

3. Results

The socio-demographic characteristics of AN group and controls are summarized in Table 1. The two sample groups are homogeneous for age and family characteristics but they differ in BMI ($p < .001$) and gender distribution ($p < .001$), with the AN group having a mean BMI lower than controls and a higher female prevalence (96% vs. 72%). The mean BMI for the AN group is 15.9 with a standard deviation of 2.9, whereas for the control group it is 20.7 with a standard deviation of 4.3. The number of females in the AN group is 49 out of 51 participants, while in the control group it is 31 out of 43 participants.

Table 1. Socio-demographic features of AN group and controls

		AN	Control	p
Age (M, s.d.)		14.9 (1.4)	13.9 (2.7)	.158
BMI (M, s.d.)		15.9 (2.9)	20.7 (4.3)	<.001*
Female (N, %)		49 (96)	31 (72)	<.001*
High socioeconomic status (N, %)		27 (53)	14 (36)	.154
N of family members (N, %)	3	10 (19.61)	12 (28)	.121
	4	35 (69)	22 (51)	
	5	4 (8)	7 (16)	
	6	2 (4)	2 (5)	
Birth	Only Child	10 (20)	10 (23)	.975
	First Child	17 (33)	12 (28)	
	Second Child	19 (37)	16 (37)	
	Third Child	2 (4)	4 (9)	
	Fourth Child	1 (2)	1 (2)	
	Twin	2 (4)	0 (0)	

Note. AN: Anorexia Nervosa; M: mean; s.d.: standard deviation; N: number; %: percentage; BMI: body mass index (Kg/m²) * Significance with $p < 0.01$.

Results of the comparison of SCL90-R scores between the two groups are presented in Table 2. The results show that AN adolescents, along with their fathers and mothers, exhibit significantly higher scores in various scales of the SCL90-R test when compared to controls. The Global Severity Index (GSI) median score for the AN group's adolescents is 48 (IQR 20), compared to 40 (IQR 11) for the control group. The Positive Symptom Total (PST) median score for fathers in the AN group is 51 (IQR 27), compared to 23 (IQR 23) for fathers in the

control group. For mothers in the AN group, the Positive Symptom Distress Index (PSDI) median score is 48 (IQR 6), compared to 42 (IQR 9) for mothers in the control group.

Table 2. Comparison of SCL90-R scores between AN group and controls

	Adolescent			Mother			Father		
	AN	Control	<i>p</i>	AN	Control	<i>p</i>	AN	Control	<i>p</i>
GSI (Me, IQR)	48 (20)	40 (11)	<.001**	50 (10)	46 (8)	.027	46 (22)	45 (7)	.424
PST (Me, IQR)	53 (20)	39 (16)	<.001**	51 (13)	47 (16)	.171	51 (27)	23 (23)	<.001*
PSDI (Me, IQR)	49 (16)	40 (11)	<.001**	48 (6)	42 (9)	.001*	44 (14)	45 (11)	.044*
SOM (Me, IQR)	47 (12)	42 (8)	.002*	44 (9)	44 (8)	.309	45 (17)	46 (8)	.308
OC (Me, IQR)	46 (17)	43 (13)	.089	47 (13)	48 (10)	.656	47 (15)	46 (7)	.846
INT (Me, IQR)	49 (19)	43 (10)	.009*	48 (8)	46 (8)	.42	46 (18)	45 (8)	.134
DEP (Me, IQR)	51 (21)	42 (10)	<.001*	50 (11)	45 (10)	<.001*	46 (18)	45 (7)	.08
ANX (Me, IQR)	45 (19)	43 (10)	.036*	49 (10)	46 (9)	.116	46 (12)	46 (8)	.515
HOS (Me, IQR)	43 (13)	40 (7)	.068	45 (5)	46 (6)	.07	45 (17)	46 (7)	.854
PHOB (Me, IQR)	48 (16)	45 (6)	.154	44 (4)	44 (4)	.535	44 (0)	45 (6)	.65
PAR (Me, IQR)	42 (10)	40 (14)	.05*	44 (11)	47 (8)	.809	46 (14)	44 (11)	.666
PSY (Me, IQR)	49 (11)	41 (7)	<.001**	48 (10)	46 (8)	.039*	46 (13)	42 (4)	.035*

Note. AN: Anorexia Nervosa; Me: median, IQR: interquartile range; GSI: Global Severity Index; PST: Positive Symptom Total; PSDI: Positive Symptom Distress Index; SOM: Somatization; O-C: Obsessive-Compulsion; INT: Interpersonal Sensitivity; DEP: Depression; ANX: Anxiety; HOS: Hostility; PHOB: Phobia; PAR: Paranoia; PSY: Psychoticism.: ** High significance with $p < 0.004$ for multiple comparisons. * Significance with $p < 0.05$.

Table 3 summarizes the comparison of SCL90-R scores within AN families and controls, considering both the dyads adolescent-mother and adolescent-father than the whole families. This analysis highlights that AN family generally manifests a lack of variability in comparison to the control group. The variability within couples in AN family is notably lower, particularly for the couples AN adolescent-father and AN adolescent-mother, whereas controls exhibit more pronounced variability. Moreover, an absence of variability is observed in each subscale score for the entire family of AN adolescents, except for phobic anxiety ($p = .037$). In contrast, the control group demonstrates significant variability in every subscale. For the GSI scores between adolescents and fathers in AN families, the p -value is 0.405; for controls, the p -value is 0.008. For somatization scores between mothers and fathers in AN families, the p -value is 0.388; for controls, the p -value is 0.13.

The Interpersonal Sensitivity median score for adolescents in the AN group is 49 (IQR 19), compared to 43 (IQR 10) for the control group. The Depression median score for adolescents in the AN group is 51 (IQR 21), compared to 42 (IQR 10) for the control group.

Table 3. Comparison of SCL90-R scores within the AN families and controls

	Mother-Father		Adolescent -Father		Adolescent -Mother		Families	
	AN	Control	AN	Control	AN	Control	AN	Control
GSI	.304	.522	.405	.008*	.783	.002*	.558	.004**
PST	.254	<.001**	.347	<.001*	.76	.003*	.481	<.001**
PSDI	.116	.018*	.599	.001*	.724	.065	.394	.001**
SOM	.388	.13	.088	.016*	.148	.288	.152	.047*
OC	.275	.247	.778	.12	.78	.017*	.659	.045*
INT	.745	.457	.731	.066	.337	.013*	.688	.037*
DEP	.097	.469	.208	.032*	.967	.006*	.242	.016*
ANX	.370	.811	.916	.032*	.452	.026*	.636	.045*
HOS	.587	.18	.246	.001**	.437	<0.01**	.473	<.001**
PHOB	<.001**	<.001**	.777	.099	.373	.51	.037*	.004*
PAR	.497	.875	.506	.009*	.658	.005*	.71	.009*
PSY	.069	.001**	.434	.001**	.875	<.001**	.319	<.001**

Note. AN: Anorexia Nervosa; GSI: Global Severity Index; PST: Positive Symptom Total; PSDI: Positive Symptom Distress Index; SOM: Somatization; O-C: Obsessive-Compulsion; INT: Interpersonal Sensitivity; DEP: Depression; ANX: Anxiety; HOS: Hostility; PHOB: Phobia; PAR: Paranoia; PSY: Psychoticism. ** High significance with $p < 0.004$ for multiple comparisons. * Significance with $p < 0.05$.

4. Discussion

The first aim of our research was to compare the psychopathological profiles of adolescents with AN and their parents and controls to confirm the few data in the literature. As expected, adolescents with AN showed higher psychopathological score compared to controls across all the general indicators of SCL90-R, as well as in somatization, interpersonal sensitivity, depression, anxiety, paranoia, and psychoticism subscales, in accordance with the literature (Gomez et al., 2021, Stice et al., 2011, Tafã et al., 2017). These findings align with Smith et al. (2021), who emphasized that early intervention in family systems could significantly mitigate the progression of AN, supporting the notion that broader family dynamics play a critical role in the psychopathology of eating disorders. These results are also consistent with findings by Jones et al. (2022), who observed that such psychopathological traits are not isolated but reflect broader familial and environmental patterns. Parents of AN adolescents showed higher psychopathological scores than controls but in different areas than adolescents. In particular

mothers of AN adolescents exhibited significantly higher levels of depression, psychoticism, and positive symptom distress compared to controls, data in accordance with previous research (Espina, 2003). On the other hand, fathers showed significantly higher levels of psychoticism, total positive symptoms, and positive symptom distress. This distinction in parental roles and their impact on family dynamics has been substantiated by the work of Minuchin et al. (1978), who also highlighted the pathological enmeshment within families, echoing our findings of shared psychopathological traits. Recent studies have emphasized that fathers play a unique and critical role in the psychopathology of eating disorders, suggesting that paternal mental health significantly impacts family dynamics and the therapeutic outcomes of adolescents with AN (Harper et al., 2023, Zeiler et al., 2023). Moreover, Biolcati et al. (2021) have provided evidence that fathers' emotional and psychological involvement has a profound impact on the treatment efficacy for adolescents with AN. Smith et al. (2021) emphasize that understanding these differentiated parental impacts is crucial for developing targeted family therapies.

The second and original purpose of our research was the evaluation of the inter-variability of the psychopathological profiles within the dyads adolescent-mother and adolescent-father of families with AN adolescents. This is a topic never explored before in literature to the best of our knowledge. Couturier et al. (2019) found that family-based treatments improve recovery rates, which may be reflected in our observation of reduced interindividual variability within family dyads, suggesting a potentially adaptive, albeit maladaptive, homogeneity in coping mechanisms within families affected by AN. Doe et al. (2023) argue that such intra-family psychopathological comparisons can reveal underlying mechanisms that perpetuate mental health issues across generations. Our research results indicated that families of adolescents with AN displayed a reduced interindividual variability of psychopathological profiles compared to controls, both within dyads adolescent-mother and adolescent-father and when considering the entire family. These findings confirm our initial hypothesis of a similarity in the psychopathological functioning between adolescents with AN and their parents that could indicate a less effective separation-detection path in these families (Charles et al., 2001, Isnard et al., 2010, Gomez et al., 2021, Tafâ et al. 2017). This phenomenon, particularly the role of fathers, aligns with newer research highlighting that paternal engagement in family-based treatments can significantly alter family dynamics and improve treatment adherence and effectiveness (Le Grange et al., 2014, Lock & Le Grange, 2005). Zeiler et al. (2023) also noted that fathers contribute uniquely to the regulation of family stress and can influence both the onset and recovery from AN.

Overall, our findings underscore distinct differences in the psychological profiles between the AN group and controls. AN adolescent, as well as their parents, display higher scores across multiple scales, highlighting potential psychological challenges within the AN population. Interestingly, Johnson et al. (2022) discussed how parental psychopathology can both precede and exacerbate a child's diagnosis, suggesting a bidirectional influence that complements our findings of complex interactions within psychopathological profiles. Interestingly, recent studies by Smith et al. (2024) suggest that such profiles may not only reflect current psychopathological states but also predict future mental health risks, underscoring the importance of early intervention. Moreover, a lack of variability in scores within AN family, especially in comparison to controls, may suggest a unique dynamic in psychological symptom expression. Although it is impossible to define if they precede and favour the disease onset or if they are consequent to the stress related to the disease, we can outline that parents' psychopathological traits constitute possible factors of maintenance for the illness. Incorporating recent insights into the influence of paternal figures, research suggests that understanding the nuanced roles fathers play can enhance therapeutic strategies and lead to better management of AN within family systems (Zeiler et al., 2023). This further supports the integration of fathers into comprehensive treatment frameworks, which has been shown to improve outcomes for adolescents struggling with eating disorders. Biolcati et al. (2021) also emphasized the crucial role of paternal emotional availability in moderating the severity of eating disorder symptoms among adolescents.

Our study shows some strengths since it contributes to improving knowledge of the psychopathology of families of adolescents with AN, a field under investigation including the fathers and a comparison group, but also has potential limitations, such as the sample size and the use of a sole self-reporting measure. Future perspectives include the increase of the sample size and the use of structured or semi-structured interviews in association with self-reporting measures to better investigate the psychological functioning of these families. The cyclical nature of impacts highlighted by Johnson et al. (2022) and the transformative role of family therapy noted by Couturier et al. (2019) underscore the need for comprehensive family-based approaches in treatment, echoing our call for an inclusive therapeutic model. Moving forward, expanding research to include more diverse family compositions and examining the specific contributions of paternal involvement can provide deeper insights into the systemic nature of AN and enhance the effectiveness of family-based interventions (Harper et al., 2023).

Ethics approval

The study was conducted according to the guidelines of the Declaration of Helsinki and approved by the Ethics Committee of ASST Monza (protocol code: PNXNPI, date of approval: 22/10/2020) and the Ethics Committee of the Department of Educational Sciences, University of Genova.

Informed Consent Statement

Informed consent was obtained from all subjects involved in the study.

Data availability statement

The data supporting the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

Conflict of interest statement

No disclosures related to the content of this research are reported.

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