

Feeding Disorders of Early Childhood: An Empirical Study of Diagnostic Subtypes

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ABSTRACT

Objective: The aim of this study was to examine the differences among three subtypes of feeding disorders (FD), defined through the criteria of the DC:0-3R: "Infantile Anorexia" (IA), "Feeding Disorder Associated with Insults to the Gastrointestinal Tract" (FDIGT), and "Sensory Food Aversions" (SFA), by exploring mother-child interactions during feeding, children's temperament and emotional-adaptive functioning, and mothers' psychological profile and eating attitudes.

Method: The sample consisted of 146 Italian mother-child pairs, of which 51 children with IA, 47 children with FDIGT, and 48 mothers and their children with SFA. All dyads were videotaped during feeding; mothers completed questionnaires assessing their psychological profiles and eating attitudes, as well as their children's temperament and emotional/behavioral functioning.

Results: Analyses revealed significant differences between the diagnostic groups of FD in relation to mother-child interactions during feeding, children's temperament and emotional-adaptive functioning, and mothers' psychological profile and eating attitudes.

Discussion: Both interactional and individual variables may contribute differently to specific FD and outcomes during childhood. Definitions by FD subtypes, using operational diagnostic criteria, and the assessment of mother-child interactions are relevant to target interventions strategies to treat specific disorders. © 2012 by Wiley Periodicals, Inc.

Keywords: feeding disorders; diagnostic subtypes; dyadic interactions; maternal and child risk factors

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Introduction

Feeding disorders (FD) in infancy and early childhood have been reported from 1 to 5% for infant pediatric hospital admissions and between 4 and 14% of infants in ambulatory care.¹ However, much research has used broader criteria for establishing diagnostic prevalence rates. Data from a variety of studies indicate that FD affect between 6 and 25-45% of young children.^{1,2} In summary, an exact evaluation of the prevalence or incidence rates of infant FD, and of particular types of infant FD, has

not been recognized because of the variability of definitions used and the lack of a general diagnostic classification of FD.¹⁻⁴ Moreover, there is not enough longitudinal evidence-based research that clarifies the clinical course of early FD. Although the diagnostic and statistical manual of mental disorders, fourth edition, text revision (DSM-IVTR)⁵ introduced the diagnostic category of "Feeding disorder of infancy and early childhood", however, the diagnostic criteria are too wide and do not differentiate between the different subtypes of FD. Different subtypes of FD have been evidenced in various research under different diagnostic definitions not completely overlapping.²⁻⁴

In the last revision of the "Diagnostic Classification of Mental Health and Developmental Disorders of Infancy and Early Childhood-Revised"-DC:0-3R, Zero-to-Three,⁶ a diagnostic system, which classifies psychopathological pictures in the first years of life, has introduced a classification of "Feeding Behavior Disorder," which includes six different diagnostic subtypes of FD. The specific subtypes are defined by manifestations' onset, configuration of symptoms and clinical course. The recognition of subtypes of FD may be useful to explore the factors involved in the etiology, clinical

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course, choice of treatment and its efficacy. For these reasons, this classification of FD proposed by DC:0-3R has been used by clinicians to specify the diagnosis of diagnostic and statistical manual of mental disorders, fourth edition (DSM-IV) and International statistical classification of diseases and related health problems, 10th revision (ICD-10).

Our article will explore the following three subtypes of FD, defined through the diagnostic criteria of the DC:0-3R⁶: “Infantile Anorexia (IA),” “Feeding Disorder Associated with Insults to the Gastrointestinal Tract” (FDIGT), and “Sensory Food Aversions (SFA)”.

IA is characterized by the child’s refusal to eat adequate amounts of food for at least 1 month. The infant/toddler with IA rarely communicates hunger, lacks interest in food and eating, and shows growth deficiency. The child’s food refusal does not follow a traumatic event and is not due to an underlying medical illness. The onset of the food refusal often occurs during the transition to spoon- and self-feeding, before the child is 3 years old. Cross-sectional studies conducted on children with IA, from 6 months to 3 years, and their mothers, showed that children with IA have a fussy–difficult temperament, a heightened level of physiological arousal, are less adaptive, with irregular feeding and sleeping patterns. During toddlerhood and middle childhood, these children with IA manifest internalizing and externalizing emotional–behavioral difficulties.^{3,7–9} Moreover, the feeding interactions between children with IA and their mothers are characterized by low dyadic reciprocity, interactional conflict, and negative affects. Mothers show a psychopathological profile, characterized mainly by anxiety, depression, and dysfunctional eating attitudes.^{3,7,8,10}

FDIGT is characterized by child’s food refusal which follows a major aversive event or repeated noxious insults to the oropharynx or gastrointestinal tract (e.g., choking, severe vomiting, reflux, insertion of nasogastric or endotracheal tubes, and suctioning) that trigger intense distress in the infant or young child. The child shows anticipatory distress when positioned for feeding, and resists intensely when a caregiver approaches with a bottle or food, and may refuse food offered partially or totally, which represents a specific feature as it has been evidenced in research.¹¹ This subtype has been described under other clinical definitions as: “Traumatically Acquired Conditioned Dysphagia,”¹² “Post-traumatic Feeding Disorder,”¹¹ “Functional Dysphagia,”¹³ and “Swallowing Phobia.”¹⁴

SFA are characterized by the child’s refusal to eat specific foods with specific tastes, textures, and/or smells; onset of the food refusal occurs during the introduction of a novel type of food, but the child eats without difficulty when offered preferred foods. Parents usually report that when specific foods were placed into the infants’ mouths, the infants’ aversive reactions ranged from grimacing to gagging, vomiting, or spitting out the food. After an initial aversive reaction, the infants usually refuse to continue eating that particular food and become distressed if forced to do so. Research on SFA is quite limited, although a number of authors have described similar symptoms of this subtype under different names; for example, “selective eaters,”^{15–17} “choosy eaters,”¹⁸ “picky eaters,”¹⁹ and “food neophobia.”²⁰ In addition to the observations of distress and conflict during mealtime, Timimi et al.¹⁷ reported that during school age, selective eating is associated with social limitations, general anxiety, obsessive–compulsive symptoms, and school difficulties. Nicholls et al.¹⁶ have also evidenced anxiety problems associated with selective eating.

Building on previous research described above, the aim of this study was to examine the differences among the three subtypes of FD, defined through the criteria of the DC:0-3R: IA, FDIGT, and SFA, by exploring:

1. the quality of the interactional patterns between mothers and children during feeding;
2. the children’s temperament and emotional functioning; and
3. the maternal psychological functioning and eating attitudes.

Method

Participants

The sample consisted of 146 Italian mother–child pairs, of which 51 children with IA group, 47 with FDIGT group, and 48 with SFA group.

FD groups were selected through a clinical and diagnostic evaluation which excluded the presence of current organic causes as the origin of children’s difficulties in establishing regular feeding rhythms and an intake of adequate amounts of food, evaluating the possible presence of child’s malnutrition, based on the weight and height measurements from the National Center for

TABLE 1. Percentage of children malnutrition (both acute and chronic) for the three feeding disorders groups

	Acute				Chronic		
	Absent (%)	Mild (%)	Moderate (%)	Severe (%)	Mild (%)	Moderate (%)	Severe (%)
IA group	0	0	11.8	13.7	9.8	31.4	33.3
FDIGT group	27.7	14.9	21.3	6.4	4.3	12.8	12.8
SFA group	66.7	10.4	12.5	0	4.2	4.2	2.1

Health Statistics' Growth Charts using Waterlow's criteria^{21,22} (Table 1).

The diagnosis of the three FD subtypes was made independently by two clinicians ($k = .93$), on basis of the criteria of the DSM-IV-TR⁵ for Feeding Disorder of Infancy or Early Childhood, and of the DC:03-R criteria.⁶ The aim of investigating the diagnostic subtypes according to the CD:0-3R has led to the exclusion of subjects with comorbidity of IA and SFA ($N = 31$). Moreover, with respect to the diagnosis of FDIGT, a homogeneous clinical group of children with normal psychomotor development and history of Gastroesophageal Reflux was selected. For this reason, children who had a history of esophageal atresia ($N = 8$), an association of psychomotor retardation and a history of Gastroesophageal Reflux ($N = 5$), genetic syndromes, and a history of Gastroesophageal Reflux ($N = 6$) were ruled out.

Procedures

The mothers filled out in a counterbalanced order the following instruments: (a) two "report-form instruments" for the evaluation of their children temperament and emotional-adaptive functioning, (b) two "self-report instruments" for their current psychological symptom status, and (c) a clinical diagnostic interview. Afterward, in a laboratory and from behind a one-way mirror, mother-child dyads were videotaped during a twenty-minute feeding session. The videotapes were coded through two "observational scales" by two trained independent raters, blind to the diagnosis. The study protocol was reviewed and approved by the Institutional Review Board, and all parents signed informed consent.

Measures

The "Observational Scale for Mother-Infant Interaction during Feeding" measures normal and/or at-risk feeding interactions between mother and child (age range: 1-36 months).²³ The mother was asked to bring the type of food she usually offered her child. The Italian version has 40 items—rated on a four-point Likert Scale—and four subscales: "Affective State of the Mother," "Interactional Conflict," "Food Refusal Behaviors of the Child," and "Affective State of the Dyad." Higher scores in the Affective State of the Mother refer to greater difficulties of the caregiver in showing positive affect and to higher frequency of negative affect, such as sadness or distress. The subscale Interactional Conflict evaluates both the presence and in-

tensity of exchanges of conflict within the dyad (e.g., the mother directs the meal according to her own emotions and intentions, rather than following the signals from the child). The subscale Food Refusal Behaviors of the Child explores behavioral and emotional characteristics of feeding patterns of the child (e.g. being easily distracted, opposition, and negativity). Higher scores in the Affective State of the Dyad refer to the difficulties of the caregiver in supporting autonomous initiatives of the child (by means of requests, insistent orders, and criticism), while the child demonstrates distress and is oppositional. In the Italian version, the discriminant analysis showed correct group classification ranging from 82 to 92%, and construct validity for the tool has been proved. The inter-rater reliability ranged between .82 and .92 (intraclass correlation coefficients, ICC).²⁴ The ICC in this study, measured on a subsample of 94 mother-child dyads, ranged between .79 and .89 (mean = .83). The "Feeding Resistance Scale"¹¹ was developed with the aim to measure more specifically individual child's reactions to the feeding situation and to food, and, in particular, the characteristics of the child's resistance to feeding situations and to swallowing. It includes 20 items—rated on a 4-point Likert Scale—and three subscales: "Preoral Resistance I" which evaluates anticipatory anxiety and child's resistance to feeding at the sight of feeding utensils and while being positioned for feeding; "Preoral Resistance II" which measures child's resistance to the presentation of food, and the "Intraoral Resistance," which evaluates child's resistance to swallowing food when it is in his/her mouth. Internal reliability of the Feeding Resistance Scale is quite satisfactory (α ranging from .64 to .83); inter-rater reliability was high for each subscale, ICC ranged from .88 to .93.¹¹ The mean ICC between the two raters in this study was .89. The observational data for mother-child feeding interactions were coded by two independent raters, trained to the use of the instruments, and who were blind to the child's diagnosis.

The "Italian Questionnaires of Temperament," QUIT,²⁵ are structured in 60 items describing child behavior in different contexts: child with the others; child on his play time; child facing of novelty or while s/he is performing an activity or a task. The items refer to six dimensions: "Motor Activity," "Attention," "Inhibition to Novelty," "Social Orientation," "Positive Emotionality," "Negative Emotionality." The QUIT were validated on a great number of subjects ($N = 1533$) by means of a repeated administration to both parents and child's reference teachers.

The Cronbach's α raises an acceptable coherence ($\alpha > .60$ in every dimension). Correlational analyses, among mothers', fathers', and teachers' reports, underline its validity to measure the objective components of temperament ($R > .52$).²⁵

The "Child Behavior Checklist," CBCL/11/2-5,²⁶ evaluates, on 99 items, child (age range: 18–36 months) behaviors and emotions in various areas of their daily adaptation and functioning. It measures three syndrome scales: "Internalizing," "Externalizing," and "Neither Internalizing Nor Externalizing." The Internalizing scale includes the syndromes: "Emotionally Reactive," "Anxious/Depressed," "Withdrawn," "Somatic Complaints"; the Externalizing scale includes: "Attention Problems" and "Aggressive Behavior"; finally, the Neither Internalizing Nor Externalizing scale identifies the syndromes of "Sleep Problems" and "Other Problems" that are not exclusively associated with other symptoms of the same Internalizing or Externalizing scales. The parent evaluates the child on a 3-point scale according to the intensity and frequency, which best describes the behavior of the child. Internal consistency coefficients were quite satisfactory (α ranging from .65 to .96); criterion-related validity is supported by the ability of the CBCL's quantitative scale scores to discriminate between demographically matched, referred, and nonreferred children.²⁶

The "Psychiatric Symptom Checklist-90-Revised," SCL-90-R,²⁷ a 90-item self-report symptom inventory, is a measure of current psychological symptom status and is scored on nine subscales—"Somatization," "Obsessive-Compulsive," "Interpersonal Sensitivity," "Depression," "Anxiety," "Hostility," "Phobic Anxiety," "Paranoid Ideation," and "Psychoticism"—and three Global Indices of Distress (Global Severity Index, Positive Symptom Distress Index, and Positive Symptom Total), which indicate the severity and depth of individual psychological distress. Internal consistency of the SCL-90-R is satisfactory (α ranging from .77 to .90) and high levels of construct and convergent-discriminant validity have been demonstrated.²⁷ The Eating Attitudes Test, EAT-40,²⁸ is a 40-item scale identifying abnormal concerns with eating and weight in the adult population. It consists of three subscales: "Dieting," "Bulimia/Food Preoccupation," and "Oral Control." The EAT-40 has shown a high degree of internal reliability (α coefficient from .79 to .94) and has been validated with adult patients with anorexia nervosa.²⁸

The "Structured Clinical Interview for DSM-IV Axis I Disorders," SCID-I,²⁹ is a semistructured interview for making the major DSM-IV Axis I diagnosis. The output of the SCID is a record of the presence or absence of each of the disorders being considered, for current episode (past month) and for lifetime occurrence. In this study, the SCID was administered by an assessor blind to the child's diagnosis. The reliability and validity of the SCID-I has been reported in several studies and the results show a

good applicability of the instrument in different cultural contexts; the κ values may vary within a range from .40 to .95.^{29,30}

Data Analysis

A preliminary screening of data showed few data missing for each instrument (<5% for each instrument). Missing data were corrected according to each test norms or by inserting the scale average for the participant with missing data. To examine the quality of the interactional patterns between mothers and children during feeding in the three diagnostic groups, Multivariate analyses of variances (MANOVAs) were carried out on the Feeding Scale and on the Feeding Resistance Scale dimensions with group as independent factor. In all of the MANOVAs, univariate analyses were then conducted on significant effects and Duncan test (Bonferroni correction) was used for contrasts. On the assessment of child's temperament a chi-square analysis was conducted ("emotive," "normal," "calm," or "difficult"). MANOVAs were carried out on the temperamental dimensions among the three FD groups and a normally developing group of control children (ND group)^a. A further MANOVA (FD groups as independent factor) was conducted on CBCL total scores (Internalizing, Externalizing, and Neither Internalizing Nor Externalizing Scales) and a separate MANOVA was run on the CBCL dimensions to examine differences between emotional functioning of the three diagnostic subtypes. To investigate the maternal psychopathological status, a series of MANOVAs were carried out on the scores (transformed in their square root whenever the distribution deviated from normality) obtained on the SCL-90-R (the three global indexes of distress and, subsequently, the subscales) and the EAT-40 (total score and, subsequently, the subscales), using FD groups as independent variable. Finally, a chi-square analysis on the mother's clinical profile (measured through the Structured Clinical Interview for DSM-IV Axis I Disorders) was run. As a final step, to further investigate whether there were specific characteristics of the children, of the mothers, and of their interactions that differentiate among the three subtypes of child feeding disorder, a discriminant functions analysis (standard method) was performed on the three groups, using main variables relating to interactional mother-child feeding patterns, children's temperament/emotional functioning and mothers' clinical and psychological characteristics.

Results

The children's mean ages for the diagnostic subtypes were follows: IA group (mean = 24.2, SD = 4.5), FDIGT group (mean = 22.9, SD = 4.1), and

TABLE 2. Summary table of assessment results comparing IA group, FDIGT group, and SFA group: (0) normal range, (+) significantly higher than (0), and (+ +) significantly higher than (+)

	IA Group	FDIGT Group	SFA Group
Feeding Interaction Feeding Scale	++	++	+
Feeding Resistance Scale	+	++	+
Child	IA Group	FDIGT Group	SFA Group
Difficult temperament–QUIT	++	+	0
Internalizing problems–CBCL/1-5	++	+	+
Externalizing problems–CBCL/1-5	+	++	+
Mother	IA Group	FDIGT Group	SFA Group
Psychopathological profile–SCL-90-R	+	+	0
Eating attitudes–EAT-40	++	+	0
Psychopathological diagnosis–SCID-I	+	+	0

SFA group (mean = 23.6, SD = 4.8), respectively. The maternal mean age for the three diagnostic subtypes was mothers' IA group (mean = 32.9, SD = 3.7), mothers' FDIGT group (mean = 32.2, SD = 2.9), and mothers' SFA group (mean = 32.4, SD = 3). The gestational age and the development of all the children were in the normal range. Most children were firstborn (73%) and breast-fed (85%). Most mothers were married (77%). Parents' socioeconomic status (SES), according to the Hollingshead's criteria (Hollingshead, 1975), was calculated from the occupation and educational level of both parents, ranging from 1 = highest to 5 = lowest level of SES. Modal SES score was 3 for all the clinical groups.

Table 2 summarizes the results for feeding interactions, child and mother assessments comparing the three FD groups, whereas **Tables 3, 4, and 5** give the details with respect to the control group and caseness. Statistics are reported on the tables or/and on notes at the end of the tables.

Infantile Anorexia Diagnostic Subtype

Analyses on the "Feeding Scale" and on "Feeding Resistance Scale" showed that the IA group's mother-child pairs obtained higher scores and over the cutoff of the clinical range in all of the Feeding Scale subscales and higher score in the Preoral II subscale than the SFA group (**Table 3**). Chi-square analysis on the assessment of temperament evidenced that all children in the IA group were classified as difficult [$\chi^2(2) = 82.81; p < .001$], further showing the lower scores in Positive Emotionality, compared with the ND group of children and the higher scores in the Social Orientation, Motor Activity, and Negative Emotionality dimensions (**Table 4**). They obtained scores over the cutoff of the clinical range in Anxious/Depressed, Withdrawn,

and Somatic Complaints (**Table 4**). With respect to the assessment of mother's psychological symptom and clinical profile, analyses showed that mothers of the IA group obtained scores over the cutoff of the clinical range in all of the symptomatic dimensions and a particularly high score (relative to the others groups) in Depression, Dieting, Bulimia/Food Preoccupation, and Oral Control (**Table 5**). Moreover, analysis on SCID-I showed a significant difference among the mothers of the FD groups ($\chi^2(10) = 87.05; p < .001$); specifically, 51% of the mothers (26 vs 51) of the IA group obtained a clinical diagnosis of "Depressive Disorder."

Feeding Disorder Associated with Insults to the Gastrointestinal Tract Diagnostic Subtype

Significant differences in the Feeding Resistance Scale assessment showed that the children of the FDIGT group obtained higher scores in all Resistance dimensions (**Table 3**). Considering the temperament assessment, over 60% (24 vs 39) of the FDIGT group of children were classified as "difficult." These children obtained lower scores in Positive Emotionality, compared with the ND group of children, and higher scores in Inhibition to Novelty, in comparison with the other FD groups and the ND group of children (**Table 4**). Analyses on the child's emotional functioning evidenced that the FDIGT group obtained a score over the cutoff of the clinical range in Aggressive Behavior dimension, and significantly higher than IA group and SFA group (**Table 4**). Moreover, the significant Group effect on SCL-90-R dimensions showed that the mothers of FDIGT group of children had higher scores in Anxiety and Obsessive-Compulsive symptoms, compared with the mothers of the IA group and SFA group, and obtained higher scores in EAT-40 dimensions than the mothers of the SFA group (**Table 5**). On the basis of the SCID-I, 27% (13 vs 47) of the mothers of the FDIGT group had a diagnosis of "Anxiety Disorder."

Sensory Food Aversions Diagnostic Subtype

Considering mother-child feeding interactions, only the mothers of the SFA group of children had a score under the clinical range cutoff in Affective State of the Mother, during the feeding interaction with their children; finally the Feeding Resistance Scale assessment showed that the SFA group of children had significantly higher scores in the Preoral I with respect to the IA group (**Table 3**). Analysis on temperament showed that none of children was "difficult." With respect to the temperamental dimensions, the SFA group of children had higher scores in Positive Emotionality than the other clinical

TABLE 3. Means (standard deviations) of the Feeding Scale and of the Feeding Scale Resistance dimensions scores by IA group, FDIGT group, and SFA group

Feeding Scale	IA Group	FDIGT Group	SFA Group	Caseness
Affective State of the Mother	16.8 (.48) ^a	13.7 (.50) ^b	9.3 (.51) ^c	>11.2
Interactional Conflict	31.1 (.74) ^a	24.8 (.77) ^b	18.2 (.77) ^c	>12.5
Food refusal behavior	18.2 (.51) ^a	14.3 (.53) ^b	11.4 (.53) ^c	>6.5
Affective State of the Dyad	13.2 (.32) ^a	9.4 (.33) ^b	6.9 (.34) ^c	>4.7
Feeding Resistance Scale	IA Group	FDIGT Group	SFA Group	Control means
Preoral I	1.9 (.41) ^a	10.5 (.43) ^b	7.8 (.44) ^c	2.2 (.38)
Preoral II	14.1 (.63) ^a	17.2 (.64) ^b	8.4 (.66) ^c	3.3 (.58)
Intraoral	9.6 (.59) ^a	15.3 (.61) ^b	8.4 (.61) ^a	3.2 (.49)

Means in rows not sharing a common letter differ significantly ($p < .05$). The last column reports cut off scores or means scores in the referring population.

Feeding Scale: group effect ($\lambda = .34$; $F(8, 280) = 24.55$; $p < 0.001$; $\eta_p^2 = .41$); Affective State of the Mother: $F(2, 143) = 59.3$; $p < 0.001$; $\eta_p^2 = .45$; Interactional Conflict: $F(2, 143) = 72.8$; $p < 0.001$; $\eta_p^2 = .50$; food refusal behavior: $F(2, 143) = 44.5$; $p < 0.001$; $\eta_p^2 = .38$; Affective State of the Dyad: $F(2, 143) = 93.1$; $p < 0.001$; $\eta_p^2 = .57$.

Feeding Resistance Scale: Group effect ($\lambda = .13$; $F(6, 282) = 82.7$; $p < 0.001$; $\eta_p^2 = .64$); Preoral I: $F(2, 143) = 106.4$; $p < 0.001$; $\eta_p^2 = .59$; Preoral II: $F(2, 143) = 46.9$; $p < 0.001$; $\eta_p^2 = .39$; Intraoral: $F(2, 143) = 37$; $p < 0.001$; $\eta_p^2 = .34$.

TABLE 4. Means (standard errors) of the temperament (upper) and CBCL (lower) dimensions scores by IA group, FDIGT group, SFA group, and the Control group

Temperament Dimensions	IA Group	FDIGT Group	SFA Group	Control Group	$F(3, 167)$
Soc Orient	3.7 (.05) ^a	3.4 (.05) ^b	3.4 (.05) ^b	4.3 (.05) ^c	72.6 ^{**}
Inhib Novelty	3.6 (.03) ^a	4.0 (.04) ^b	2.6 (.04) ^c	2.1 (.04) ^d	441.2 ^{**}
Motor Activ	4.1 (.05) ^a	3.6 (.05) ^b	3.0 (.05) ^c	3.4 (.04) ^b	82.3 ^{**}
Positive Emot	2.7 (.06) ^a	3.0 (.06) ^b	4.5 (.06) ^c	5.0 (.05) ^d	420.3 ^{**}
Negative Emot	4.6 (.07) ^a	3.2 (.07) ^b	2.5 (.07) ^c	2.3 (.06) ^c	265.6 ^{**}
Attention	3.7 (.06) ^a	4.0 (.07) ^b	3.09 (.06) ^c	4.0 (.06) ^b	49.9 ^{**}
CBCL/1-5 Subscales	IA Group	FDIGT Group	SFA Group	Caseness	$F(2, 143)$
Emo React	7.2 (.39) ^a	6.8 (.40) ^a	10.5 (.41) ^b	>7	25.07 ^{**}
Anx/Dep	11.8 (.34) ^a	4.8 (.35) ^b	4.2 (.36) ^b	>8	149.09 ^{**}
Som Comp	7.1 (.36) ^a	7.4 (.38) ^a	3.8 (.37) ^b	>6	29.19 ^{**}
Withdrawn	6.8 (.34) ^a	5.3 (.35) ^b	2.8 (.35) ^c	>4	34.11 ^{**}
Att Prob	5.5 (.21) ^a	4.1 (.22) ^b	2.5 (.22) ^c	>7	47.9 ^{**}
Agg Beh	15.3 (.99) ^a	24.6 (1) ^b	10.6 (1) ^c	>6	48.2 ^{**}
Sleep Prob	6.3 (.28) ^a	4.3 (.29) ^b	2.4 (.29) ^c	>7	47.9 ^{**}

Notes: Emo React, emotionally reactive; Anx/Dep, anxious/depressed; Som Comp, somatic complaints; withdrawn, withdrawn/depressed; Att Prob, attention problems; Agg Beh, aggressive behavior; Sleep Prob, sleep problems. Means in rows not sharing a common letter differ significantly.

Temperament dimensions: Group effect ($\lambda = .006$; $F(18, 458) = 126.3$; $p < 0.001$; $\eta_p^2 = .81$).

CBCL/1-5: Group effect on Internalizing Scales ($\lambda = .18$; $F(8, 280) = 46.6$; $p < 0.001$; $\eta_p^2 = .57$), Externalizing Scales ($\lambda = .37$; $F(4, 284) = 45.5$; $p < 0.001$; $\eta_p^2 = .39$), Neither Internalizing Nor Externalizing Scales ($F(2, 143) = 34.2$; $p < 0.001$; $\eta_p^2 = .32$).

$p < .01$

cal groups, even if they had not so high scores as the ND group of children. Moreover, the SFA group had significantly lower scores in Motor Activity and Attention dimensions than the ND group of control (Table 4). Analyses on the child's emotional functioning showed that the SFA group of children obtained an over cut off clinical range score in the Emotional Reactivity dimension (Table 4). Moreover, mothers of SFA group of children obtained lower scores that were under the cut off clinical range score, in all psychopathological symptomatic dimensions, including EAT-40 dimensions, except for psychoticism dimension (Table 5), and they had none psychopathological diagnosis in the SCID-I.

Discriminant Functions Analysis

Mother-child interactional variables and individual child's and mother's variables were selected

both on the basis of previous research,^{3,7,8,11} and of statistical criteria (collinearity, multivariate normality). The following discriminant variables were considered: (a) Interactional Conflict and Preoral Resistance I dimensions for the mother-child feeding interactional patterns; (b) children: Social Orientation and Inhibition to Novelty (QUIT), Anxious/Depressed, and Aggressive Behavior (CBCL/11/2-5); (c) mothers: Anxiety and Dysfunctional Eating Attitudes (SCL-90-R, EAT-40).

On the basis of preliminary statistical analyses, two subjects (outliers) were excluded. Analysis showed two significant discriminant functions: $F1 \lambda = .012$; $[2 (16) = 494.4$; $p < .001$; $F2 \lambda = .17$; $2 (7) = 194.8$; $p < .001$]. All the variables contribute significantly to the discrimination function; 100% of the subjects were correctly classified by Functions 1 and 2. As in Table 6, variables mostly associated

TABLE 5. Means (standard errors) of the nontransformed SCL-90-R (total and single scales) scores and of the EAT-40 (total scales and subscales) by IA group, FDIGT group, and SFA group

	IA Group	FDIGT Group	SFA Group	F(2, 143)	Caseness
SCL-90-R					
GSI	2 (.05) ^a	1.39 (.05) ^b	.62 (.05) ^c	172.5 ^{**}	>.78
PSDI	2.43 (.04) ^a	2.09 (.04) ^b	1.4 (.04) ^c	133.3 ^{**}	>1.88
PST	74.1 (1.8) ^a	57.8 (1.9) ^b	35.8 (1.9) ^c	109.9 ^{**}	>46
SOM	1.7 (.05) ^a	1.08 (.05) ^b	.65 (.05) ^c	100.2 ^{**}	>1.03
O-C	1.7 (.11) ^a	2.5 (.12) ^b	.08 (.13) ^c	49.6 ^{**}	>1.03
I-S	1.7 (.06) ^a	1.2 (.06) ^b	.51 (.06) ^c	93.4 ^{**}	>.91
DEP	3.2 (.06) ^a	1.02 (.07) ^b	.62 (.07) ^c	403.6 ^{**}	>1.11
ANX	1.9 (.10) ^a	2.5 (.11) ^b	.8 (.12) ^c	57.3 ^{**}	>.91
HOS	1.7 (.07) ^a	.97 (.08) ^b	.54 (.08) ^c	57.4 ^{**}	>.83
PHOB	1.9 (.06) ^a	1.1 (.06) ^b	.57 (.07) ^c	127.4 ^{**}	>.58
PAR	1.9 (.06) ^a	1.2 (.07) ^b	.46 (.07) ^c	119.7 ^{**}	>.91
PSY	1.8 (.05) ^a	1.4 (.06) ^b	.62 (.06) ^c	161.3 ^{**}	>.42
EAT-40					
Total	50.8 (1.9) ^a	17.06 (2) ^b	7.3 (2) ^c	128.2 ^{**}	>29
D	17.4 (.9) ^a	6.2 (.9) ^b	2.5 (.9) ^c	72.6 ^{**}	—
BFP	6.8 (.4) ^a	2.3 (.4) ^b	.7 (.4) ^c	55.03 ^{**}	—
OC	9.2 (.3) ^a	2.7 (.4) ^b	1.2 (.4) ^c	117.8 ^{**}	—

Notes: GSI, global severity index; PSDI, positive symptom distress index; PST, positive symptom total; SOM, somatization; O-C, obsessive compulsive; I-S, interpersonal sensitivity; DEP, depression; ANX, anxiety; HOS, hostility; PHOB, phobic anxiety; PAR, paranoid ideation; PSY, psychoticism; D, dieting; BFP, bulimia and food preoccupation; OC, oral control. Means in rows not sharing a common letter differ significantly ($p < .05$). The last column reports the cut off score, when available, in the referring population.

^{**} $p < .01$

(after rotation) with F1 were as follows: Interactional Conflict and Preoral Resistance I interactional dimensions (Feeding Scale and Feeding Resistance Scale), Anxious/Depressed (CBCL/11/2-5), and Maternal Dysfunctional Eating Attitudes (EAT-40); variables mostly associated with F2 were Inhibition to Novelty (QUIT), Aggressive Behavior (CBCL/11/2-5), and Maternal Anxiety (SCL-90-R). The three group centroids showed that the IA group had a high score in F1 and F2; the FDIGT group had a low score in F1, and a high score in F2; the SFA group had a low score in F1 and F2.

Discussion

Our findings showed a clear differentiation among the three DC:0-3R' subtypes of FD on the basis of the interactional, child's, and mother's individual variables explored. As regards IA, that is the most investigated and well-known FD in the recent literature, our results are consistent with previous researches, highlighting dysfunctional mother-child interactions during feeding, especially in the dyadic conflict,^{3,8,10} "difficult temperament" and emotional regulation difficulties^{3,7-9} in children, and a psychopathological profile of their mothers, mainly characterized by depression and dysfunctional eat-

TABLE 6. Correlations between variables and rotated functions (upper) and canonical discriminant functions coefficients (lower)

	Variables	Function1	Function2
Dyadic interaction	Interactional Conflict	.22	.15
	Preoral 1	-.37	.16
	Social orientation	.13	.001
Child's temperament characteristics	Inhibition to Novelty	-.06	.96
	Anxious/depressed	.43	.002
Child's emotional functioning	Aggressive behavior	-.13	.31
	Anxiety	-.03	.31
Maternal characteristics	Dysfunct eat attitudes	.43	.06
		Function1	Function2
IA group	4.7	1.3	
FDIGT group	-2.1	2.4	
SFA group	-2.7	-3.6	

^aA mother-child control group ($n = 50$; children presented a normal growth rate and no physical or mental disorders) was sampled from child-care centers to have referring scores in temperamental dimensions. The mean age was 24.9 ($SD = 4.6$) for children and 32.4 ($SD = 2.8$) for their mothers. The ND group was paired with FD groups for age (both of the mother and the child), and parents' SES.

ing attitudes.^{3,7,8,31} This pattern of disturbed eating behavior and emotional symptoms in both the children and their mothers supports recent findings showing that dyadic Interactional Conflict, maternal symptomatic characteristics, temperamental, and emotional ratings of the child are reciprocally involved in the origin and persistence of IA.^{3,7,8,31}

Moving to the FDIGT diagnostic subtype, we found that in the interactional context these children showed fear and distress when positioned for feedings and/or presented with food, demonstrating anticipatory anxiety to feeding situation, in line with other researches.^{11,32} In addition, we found that a lot of these children were classified as difficult in their temperament, in particular in inhibition to novelty. On average they exceed the cut off score for the clinical range in aggressive behavior dimension, which is mainly characterized by angry moods, temper tantrums, stubbornness, child screams a lot, is easily frustrated, and wants a lot of attention. Taking into account the history of traumatic feeding experiences, the emotional dysregulation, and temperamental inhibition to novelty in these children may contribute to further stabilize their feeding problems. Moreover, their mothers had significantly higher scores in anxiety and obsessive-compulsive symptoms, and some of them received a diagnosis of anxiety disorder. In light of these data, we assume reciprocal influences between dysregulation in emotional functioning of these children and the anxiety/obsessive-compulsive symptoms of their mothers. In fact, maternal symptomatic anxiety may compromise the parenting capacity to moderate the impact of the

child's traumatic and stressing experience in the oral area upon the child emotional regulation and adaptive behavior.

Finally, in SFA diagnostic subtype, the little studied phenomenon of eating a limited range of foods associated with an unwillingness to try new foods, we definitely found more adequate mother-child feeding interactions with respect to the other FD groups. None of these children was difficult in temperament and their mothers did not receive any psychopathological diagnosis. However, these children showed an over cut off clinical range score in the emotional reactivity dimension, which evidences difficulties in emotional adjustment for any change in routine and disturbance due to new situations. This finding may be linked with our results on child's resistance to feeding situation and mother-child Interactional Conflict during feeding. This pattern let us to believe that forcing change in feeding without adequate support to manage anxiety may be a risk factor in SFA outcome. In this direction, recent longitudinal research^{16,17} has evidenced that selective eating is associated with anxiety and obsessive-compulsive symptoms, social limitations, and school difficulties.

Overall, our findings have some important implications for the clinicians and future research. First of all, we pointed out that definitions by FD subtypes, using specific operational diagnostic criteria, is an important step to better understand the clinical course for every subtype and the risk factors involved. This is pivotal to formulate a valid and sensitive diagnosis, which in turn is important to define the best strategy to treat the specific disorder. By this point of view, it should be stressed that the category of Feeding Disorder of Infancy or Early Childhood described in DSM-IVTR⁵ is too wide and indefinite to recognize different subtypes, which appear during infancy with own specific clinical picture. More in particular, our results have highlighted the importance of evaluating, in the diagnostic process, the quality of mother-child interactions during feeding by specific and validated tools. In fact, the quality of dysfunctional interactions and resistance of the child to food and feeding situation may be significantly different within the children with FD in relation to their history in oral area. Moreover, the children's temperament and emotional functioning, and their mothers' psychological profile may be risk factors, which contribute differently to specific FD and outcomes during childhood.

In this perspective, clinical data on differences between the three FD entities explored are also relevant to target interventions strategies to treat spe-

cific disorders. In the case of IA, considering the high mother-child Interactional Conflict, child difficult temperament and clinical manifestations in emotional and eating regulation both of the children and of their mothers, the therapeutic approach should have a dual focus on the child and on the parents. In case of FDIGT, considering child anticipatory anxiety and emotional dysregulation as a reaction to negative experiences in the oral area, the approach should be based on a desensitization intervention for the child and psychological support for parents. Finally, in the case of SFA, which has been overall confirmed as a less severe feeding disorder with respect to the interactional and individual variables that may be involved, the counseling intervention for parents may be helpful to prevent a negative outcome.

To conclude, a limitation of our study is the lack of systematic investigation of the role of the father and its impact on the mother-child caregiving system and child psychopathology that we plan to deepen in future research. Moreover, the current cross-sectional design of our research limits our ability to make strong claims regarding the evolution of the different diagnostic subtypes, we have explored. Future longitudinal studies are needed to further clarify clinical course of different diagnostic subtypes of FD, choices of treatment, and their efficacy.

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