Psychological and Psychosocial Impairment in Preschoolers With Selective Eating

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abstract

OBJECTIVE: We examined the clinical significance of moderate and severe selective eating (SE). Two levels of SE were examined in relation to concurrent psychiatric symptoms and as a risk factor for the emergence of later psychiatric symptoms. Findings are intended to guide health care providers to recognize when SE is a problem worthy of intervention.

METHODS: A population cohort sample of 917 children aged 24 to 71 months and designated caregivers were recruited via primary care practices at a major medical center in the Southeast as part of an epidemiologic study of preschool anxiety. Caregivers were administered structured diagnostic interviews (the Preschool Age Psychiatric Assessment) regarding the child's eating and related self-regulatory capacities, psychiatric symptoms, functioning, and home environment variables. A subset of 188 dyads were assessed a second time ~24.7 months from the initial assessment.

RESULTS: Both moderate and severe levels of SE were associated with psychopathological symptoms (anxiety, depression, attention-deficit/hyperactivity disorder) both concurrently and prospectively. However, the severity of psychopathological symptoms worsened as SE became more severe. Impairment in family functioning was reported at both levels of SE, as was sensory sensitivity in domains outside of food and the experience of food aversion.

CONCLUSIONS: Findings suggest that health care providers should intervene at even moderate levels of SE. SE associated with impairment in function should now be diagnosed as avoidant/restrictive food intake disorder, an eating disorder that encapsulates maladaptive food restriction, which is new to the *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition.*

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Dr Zucker designed the research question and study hypotheses and wrote the manuscript; Dr Copeland helped in the design and conduct of the statistical analysis; Dr Franz drafted the recruitment and Methods sections of the manuscript; Dr Carpenter assisted with the definition of study variables, data organization, and analysis; Dr Keeling assisted in data analysis including data checking and preparation of manuscript tables; Drs Angold and Egger conceptualized, designed, and conducted the study from which the data were collected; and all authors approved the final manuscript as submitted and agree to be accountable for all aspects of the work.

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WHAT'S KNOWN ON THIS SUBJECT: Selective eating is a common, burdensome eating pattern in young children. A significant subset remain selective eaters at least until adolescence and, for some, adulthood. The question is whether selective eating is a serious enough developmental pattern to warrant intervention.

WHAT THIS STUDY ADDS: This study examines whether selective eating, at 2 levels of severity, is associated with current and future psychological problems. Because moderate levels of selective eating were associated with impairment, selective eating falls within the diagnosis of avoidant/restrictive food intake disorder.

Eating problems among preschool-aged children are so pervasive that clinicians and researchers often treat them as developmentally normal. Particularly prevalent is picky or selective eating (SE): 14% to 20% of parents report that their preschooler (ages 2–5 years old) is "often" or "always" selective with food.[1,2] Yet, the fact that a behavior is relatively common does not mean that it is harmless. SE has been associated with impairment in emotional, physical, and social domains.[3–8] Both researchers and clinicians need to understand the level of severity at which SE causes impairment, so that practitioners can know when to intervene.[3]

Parents can reliably identify SE, are concerned about the social and health implications of SE, and frequently seek professional help, especially from primary care providers.[3,9] However, 63% of a sample of 300 parents of selective eaters reported that health care providers did not address their concerns (N.Z., Miranda Van Tilburg, PhD, unpublished data, June 3, 2013–current). A core problem is that the lack of systematic research on the nature, associated features, impact, or management of this prevalent behavioral pattern leaves practitioners unsure how to proceed. Absent such knowledge, they are left with the dilemma of trying to minimize parental alarm while validating and addressing parental concern.

We describe the psychopathology, associated features, impairment, and family factors associated with SE in a population cohort of preschool-aged children. We examined the degree of impairment associated with moderate and severe SE to provide practitioners with guidance on when SE warrants clinical attention. We further examined whether SE at either moderate or severe levels is predictive of psychopathology by examining a subset of this initial cohort who were followed longitudinally.

METHODS

Study Design

The Duke Preschool Anxiety Study is a population-based cohort study in children aged 24 to 71 months recruited through primary care clinics whose demographic make-up paralleled that of the surrounding county. The primary objective was to describe patterns of psychiatric comorbidity and environmental variables associated with preschool anxiety disorders. The study used a screen-stratified, cross-sectional design with 3 phases: (1) a primary care questionnaire screening phase, (2) an in-home parent interview phase, and (3) a laboratory-based case-control phase. An additional follow-up neuroimaging study using a case-controlled design was also conducted. Study participants were recontacted and recruited on a rolling basis until the desired cohort number (n = 180) was obtained.[10,11]

Phase 1: Screening

Screening took place from January 2007 to October 2010. Children aged 2 through 5 years were screened while attending one of Duke Children's Pediatric Primary Care Clinics. Children with private insurance, Medicaid, and those who are uninsured receive care at each of these clinic settings. Appointment information was screened for eligibility. Nurses approached caregivers about whether she/he was willing to speak with the screener regarding participation. If the caregiver agreed, the screener obtained written consent from the caregiver and administered screening items (see "Measures" section).

Inclusion criteria were (1) child aged between 24 and 71 months old and (2) child attended the pediatric clinic during the screening period. Exclusion criteria were as follows: (1) the child was not accompanied by a parent/legal guardian who could provide consent; (2) the parent/legal guardian was not fluent in English; (3) the index child was known to have mental retardation (IQ <70), autism, or other pervasive developmental disorders; (4) the child's sibling was already participating in the study; or (5) the provider decided that the child was too medically ill to be approached about the study. See Egger et al[10] for a detailed description of diagnostic assessments used to determine eligibility and the rationale for inclusion criteria. Of importance, SE is highly prevalent in individuals with an autism spectrum disorder.[12] Unfortunately, the goals of the parent project (the pathophysiology of preschool anxiety disorders) necessitated the exclusion of pervasive developmental disorders. We discuss the implications of this exclusion in our discussion.

A total of 4520 children aged 2 to 5 years old attended the Duke pediatric clinics on the screening days; 519 (11.5%) were excluded from screening on the basis of the exclusion criteria outlined above, 522 (13%) parents refused to participate in screening, and recruiters missed making contact with 46 parents (1.1%). Thus, of the 4001 eligible children, we screened 3433 (85.8%). There were no significant differences by age or gender between screen completers and noncompleters. Of the 3433 children screened, 944 (27.5%) screened high and 2490 (72.5%) did not screen high. All of the children who screened high and a random sample of 189 (7.5%) who did not screen high were selected to participate in phase 2: the in-home assessment phase.

Phase 2: In-Home Assessment

In-home assessments took place over 47 months from January 2007 to December 2010. Of the 1132 children selected to participate, 1113 were eligible. Nineteen (1.7%) were excluded (for meeting any of the 5 exclusion criteria mentioned above) and 196 (17.6%) parents/legal

guardians refused to participate. The Preschool Aged Psychiatric Assessment (PAPA) was conducted as well as self-report measures not reported here. There were no significant differences by age or gender between those selected and those who did not complete the in-home interview (N = 917; 82.4%) (see Fig 1).

Follow-up Assessment

A cohort of 187 children was recruited on a rolling basis from the original cohort of 917 to obtain a final sample of 180. This annual follow-up assessment was part of a study examining the developmental neurocircuitry of childhood anxiety disorders. A nested case-control design was used in which children with anxiety disorders were oversampled (representing two-thirds of the cohort), and the remainder of the sample were healthy controls from the original cohort. In analyses, weights were applied so that the nested cohort could be weighted back to the original cohort and thus were representative of the population cohort recruited from primary care. To be included in this follow-up assessment, children had to be 48 to 107 months old at the time of recruitment and (2) either (a) met symptom criteria for social anxiety disorder, generalized anxiety disorder, or separation anxiety or (b) did not meet criteria for any psychiatric disorder.

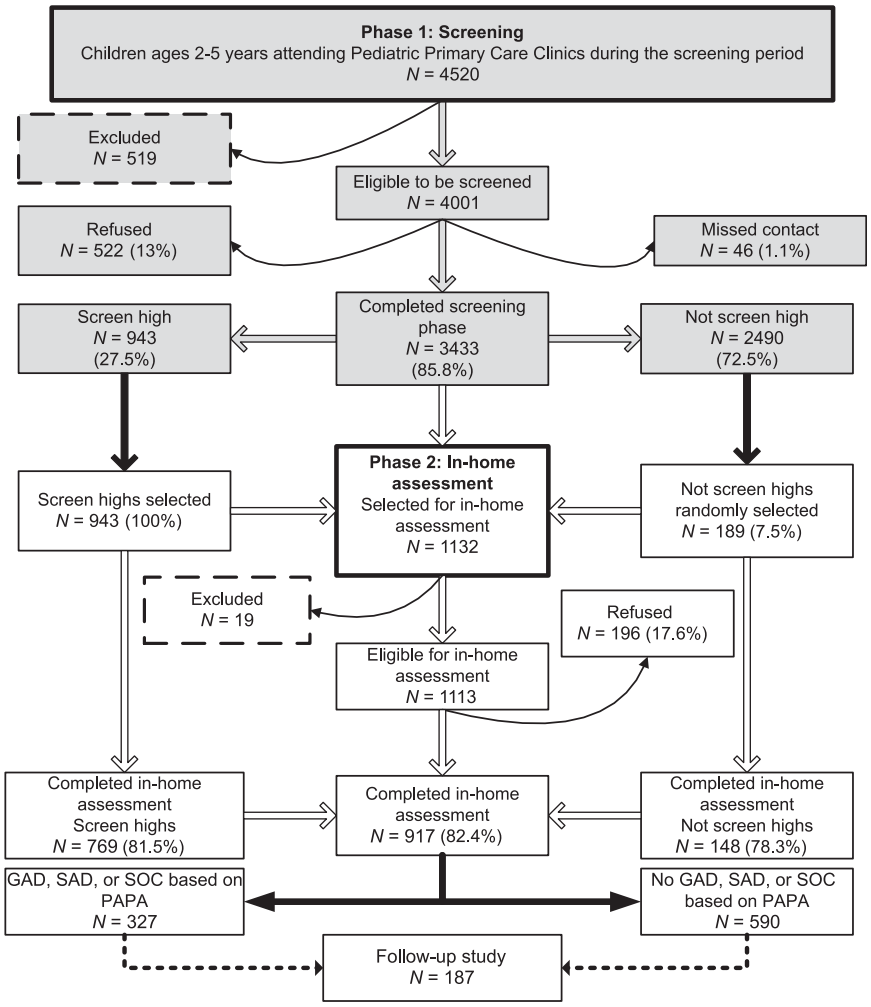

FIGURE 1
Study design and recruitment flow of participants recruited via primary care practices. All eligible children were screened. GAD, generalized anxiety disorder; SAD, separation anxiety disorder; SOC, social phobia.

Procedures

The study was approved by Duke University School of Medicine Institutional Review Board.

Measures

The Child Behavior Checklist for Ages 1.5 to 5 Years

The Child Behavior Checklist for Ages 1.5 to 5 Years[13] has been widely used both as a reliable measure of psychopathology and as a screening instrument for sample selection. Its narrow-band anxious/depressed scale consisting of 10 items was used as the screening instrument in phase 1. On the basis of data from an earlier study,[10] a cut point was defined that identified a group consisting of ~25% of a primary care clinic sample who were at high risk of having an anxiety disorder. The cut point was adjusted during the current study to ensure that the correct proportion of participants were being identified.[14]

The PAPA

The PAPA is a parent-report instrument for the assessment of psychopathology in 2- to 5-year-olds. It is based on the parent version of the Child and Adolescent Psychiatric Assessment.[10,15] A 3-month "primary period" is used rather than a longer period, because shorter recall periods are associated with more accurate recall.[16] Diagnoses made included Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, separation anxiety, generalized anxiety, social phobia, any depressive disorders, conduct disorder, oppositional defiant disorder, and attention-deficit/hyperactivity disorder (ADHD). The diagnostic reliability of the PAPA is on par with that achieved by other child, adolescent, and adult psychiatric interviews.[10]

Selective/Picky Eating

The items related to SE assess whether the child will consume only a restricted range of foods and the degree to which food selectivity impaired functioning. Interviewers were instructed not to include restricted dislikes that were typical of many children (eg, cruciferous vegetables, such as broccoli). Children were coded as "0" if there was no restricted intake (or restricted to typical dislikes). Moderate SE ("1") was coded if the child ate only within the range of his/her preferred foods, and severe SE was coded ("2") if eating with others was difficult because of the extreme limited range. This classification resulted in 3 levels of SE: normal, moderate, and severe.

Psychosocial Impairments

Psychosocial impairments secondary to psychiatric symptomatology in 17 areas of functioning related to life at home, at school, and elsewhere were also rated. A positive rating required a decrement in actual function (see ref 16 for a full description of the concept of impairment implemented in the PAPA).

Other Eating Behaviors and Sensory Experiences

The interview also contains a section of self-regulatory behaviors (eg, toleration of sensation, sleep, eating). This section was included due to the limited research on sensory sensitivity and associated food avoidance behaviors in SE.

Family Factors

The PAPA has a comprehensive background section that assesses the sociodemographic context of the family (eg, parent mental health treatment). The assessment of poverty was determined by referencing the family's reported income level against the annual US federal guidelines for poverty thresholds given the number of individuals in the family.[18]

Statistical Analyses

All associations were tested by using weighted logistic regression models in a generalized estimating equations framework implemented by SAS PROC GENMOD (SAS Institute, Cary, NC). Robust variance (sandwich-type) estimates were used to adjust the standard errors of the parameter estimates for the sampling weights applied to observations. Sampling weights were applied to account for the screen-stratified ascertainment. Bivariate analyses involved prediction of outcome variables by dummy-coded variables comparing each level of the SE variable. As such, these models tested the effect of SE status on concurrent psychiatric, impairment, and eating variables. Odds ratios, 95% confidence intervals (CIs), and *P* values are provided for all analyses. Longitudinal analyses testing the stability of SE used a similar modeling approach, while controlling for the period between assessments, given that there was variability in the length of time in which study staff were able to get families into the laboratory for follow-up assessments. For all analyses, normal, moderate, and severe SE was compared. Our strategy was to compare each level of SE to healthy controls. A significant difference with each level of SE would imply that children with moderate levels of SE are of clinical concern. A second way to examine the data would be to compare both levels of SE to each other. Significant differences would inform more tailored intervention strategies depending on the level of SE. A third approach would be to establish that groups with either moderate or severe SE are equivalent (not significantly different from each other). To perform this latter test, we would have had to define the clinical boundaries around our outcomes of interest and determine whether groups fell outside of this boundary (a noninferiority test). Because these data were lacking, we performed strategies 1 and 2.

RESULTS

SE was reported by 20.3% (n = 222) of the community sample, with 17.7% (n = 185) reporting moderate SE (a restricted diet only) and another 3.0% (n = 37) reporting severe SE (a restricted diet that limited their ability to eat with others; see Table 1). The average age of participants was 3.95 years (SD = 1.3 years) and there was no difference by SE status. Mothers of children with moderate levels of SE were more likely to have sought psychiatric treatment for themselves than mothers of children with more severe SE, whereas high maternal anxiety distinguished both clinical groups from controls. Children with moderate levels of SE were also more likely to have mothers with a history of drug abuse, whereas children with severe SE were more likely to be female.

Concurrent Associations With Psychiatric Syndromes and Symptoms

We examined the severity of SE in association with psychiatric symptom counts as well as in relation to comorbid psychiatric diagnoses (see Table 2). With regard to psychiatric diagnoses, children with severe SE were more than twice as likely to have a comorbid diagnosis of depression (2.01; 95% CI: 1.2–3.8; P = .01) or social anxiety (2.70; 95% CI: 1.3–5.5; P = .009), whereas moderate SE was not associated with increased likelihood of psychiatric diagnoses.

With regard to psychiatric symptoms, both moderate and severe SE was associated with significantly elevated symptoms of depression, social anxiety, and generalized anxiety (Fig 2). However, moderate levels of SE were also associated with symptoms of separation anxiety and ADHD, a pattern not seen when SE was severe (see Fig 2).

TABLE 1 Associations Between SE Groups and Sociodemographic and Family/Parent Functioning Variables

	No SE, % (*n*)	Moderate SE, % (*n*)	Severe SE, % (*n*)	No SE Versus Moderate SE, OR (95% CI)	No SE Versus Severe SE, OR (95% CI)	Moderate SE Versus Severe SE, OR (95% CI)	No SE Versus Moderate/Severe SE, OR (95% CI)
Total	79.3 (693)	17.7 (185)	3.0 (37)				
Gender, % female	54.3 (345)	42.2 (87)	37.5 (16)	0.6 (0.3–1.1)	0.5 (0.3–1.9)	0.8 (0.2–3.4)	0.6 (0.3–1.1)
Race, %							
White	45.9 (253)	47.8 (73)	68.5 (21)	1.1 (0.7–1.8)	1.4 (0.7–2.9)	2.4 (0.6–9.0)	1.2 (0.7–2.2)
Black	32.8 (295)	33.2 (79)	9.4 (8)	1.0 (0.6–1.7)	0.2 (0.1–0.6)***	0.2 (0.1–0.6)**	0.9 (0.5–1.6)
Poverty	12.1 (125)	12.1 (37)	7.0 (6)	1.0 (0.5–2.1)	0.7 (0.4–1.3)	0.6 (0.2–1.9)	0.9 (0.5–1.9)
Single parent	19.7 (202)	19.1 (50)	7.9 (7)	1.0 (0.5–2.0)	0.6 (0.4–1.0)*	0.4 (0.1–1.2)	0.9 (0.5–1.7)
Parental drug use	9.8 (137)	22.6 (46)	20.8 (7)	2.7 (1.3–5.5)**	1.6 (0.7–3.4)	0.9 (0.2–4.6)	2.6 (1.3–5.2)**
Maternal anxiety	21.9 (215)	42.4 (64)	54.6 (13)	2.6 (1.3–5.3)**	2.1 (1.1–4.0)*	1.6 (0.4–6.7)	2.8 (1.5–5.4)***
Parental psychiatric help	16.5 (95)	32.9 (45)	6.7 (5)	2.5 (1.2–5.4)*	0.6 (0.3–1.1)	0.2 (0.0–0.5)***	2.1 (0.9–4.3)
Parental arrest	26.3 (258)	36.7 (76)	29.1 (14)	1.6 (0.9–3.1)	1.1 (0.6–2.0)	0.7 (0.2–2.8)	1.6 (0.9–2.8)

The presence or absence of SE was based on a top 20% score on the State-Trait Anxiety Scale. Each cell provides the percentage of subjects within that selective eating group with the particular attribute. For example, the first cell for "% female" indicates the percentage of subjects reporting no SE who are female (54.3%). *$P \leq .05$, **$P \leq .01$, ***$P \leq .005$. OR, odds ratio.

Longitudinal Associations With Psychiatric Symptoms

Longitudinally, controlling for baseline levels of psychiatric symptoms, SE at baseline at either moderate or severe levels predicted changes in symptoms of generalized anxiety disorder (1.7; 95% CI: 1.1–2.6; $P = .01$) or anxiety symptoms in general (1.7; 95% CI: 1.2–2.5; $P = .006$) (see Table 3).

Associated Features of SE

Levels of SE were associated with similar patterns of related sensory and physical features (Table 4). Both moderate and severe SE was associated with heightened aversion to food and reduced growth. Both levels of SE were also associated with unique patterns of sensory experience: enhanced sensitivity to food texture, smell, visual cues, and motion. However, parents of children with more severe levels of SE also described their children as more likely to have an oral-motor problem (eg, problems with swallowing).

Concurrent Association With Impairment

Both moderate and severe SE was associated with three- to fivefold greater likelihood of conflicts regarding food (moderate SE: 3.3; 95% CI: 1.6–6.8; $P = .001$; severe SE: 5.1; 95% CI: 2.5–10.2; $P < .001$). When SE was severe, there was a twofold greater likelihood of behavior problems outside of the home (2.1; 95% CI: 1.0–4.5; $P = .05$).

DISCUSSION

We sought to describe children with SE and to determine the level of SE at which intervention is warranted. Children with SE at either moderate or severe levels were more likely to have elevated symptoms of anxiety or depression, to experience hypersensitivity to taste and texture, to have mothers with elevated anxiety, and to have family conflicts around food. Compared with children with severe SE, children with moderate SE were more likely to endorse externalizing symptoms (specifically symptoms of ADHD), to have a parent with a substance abuse history, and to have a mother who has sought mental health treatment. Children with severe SE were more likely to have a concurrent psychiatric diagnosis (depression or social anxiety) and were more likely to have an oral-motor problem that affects eating.

SE has proved challenging for health care providers, in part because of the prevalence of this eating pattern (20% of our sample endorsed SE at moderate or severe levels). Longitudinal studies have found that ~15% of children demonstrate SE through late childhood.[2] These data suggest that a certain percentage will

TABLE 2 Associations Between SE Groups and Concurrent Psychiatric Diagnoses

	No SE, % (*n*)	Moderate SE, % (*n*)	Severe SE, % (*n*)	No SE Versus Moderate, OR (95% CI)	No SE Versus Severe, OR (95% CI)	Moderate Versus Severe SE, OR (95% CI)	No SE Versus Moderate/Severe SE, OR (95% CI)
Depressive diagnosis	1.4 (31)	2.7 (14)	6.0 (5)	1.9 (1.0–3.9)	2.1 (1.2–3.8)**	2.3 (0.7–8.1)	2.3 (1.2–4.3)**
Separation anxiety disorder	9.2 (122)	15.8 (59)	15.5 (13)	1.9 (1.0–3.6)	1.35 (0.8—2.2)	1.0 (0.3–2.8)	1.9 (1.0–3.5)*
Generalized anxiety disorder	8.2 (117)	8.1 (41)	18.1 (15)	1.0 (0.6–1.8)	1.6 (1.0–2.6)	2.5 (0.9–6.8)	1.2 (0.7–2.0)
Social anxiety	6.6 (86)	7.2 (36)	33.2 (12)	1.1 (0.6–2.1)	7.0 (1.6–30.6)**	6.4 (1.5–27.4)**	1.7 (0.8–3.8)
Oppositional defiant disorder	6.0 (73)	4.4 (23)	10.5 (9)	0.7 (0.4–1.4)	1.4 (0.8–2.3)	2.5 (0.9–7.4)	0.9 (0.5–1.7)
ADHD	3.6 (56)	6.5 (23)	7.0 (6)	1.8 (0.7–4.7)	1.4 (0.8–2.5)	1.1 (0.3–4.0)	1.9 (0.8–4.4)
Conduct disorder	3.0 (36)	1.3 (7)	1.1 (1)	0.4 (0.2–1.3)	0.6 (0.2–1.8)	0.8 (0.1–7.7)	0.4 (0.2–1.2)

*$P \leq .05$, **$P \leq .01$. OR, odds ratio.

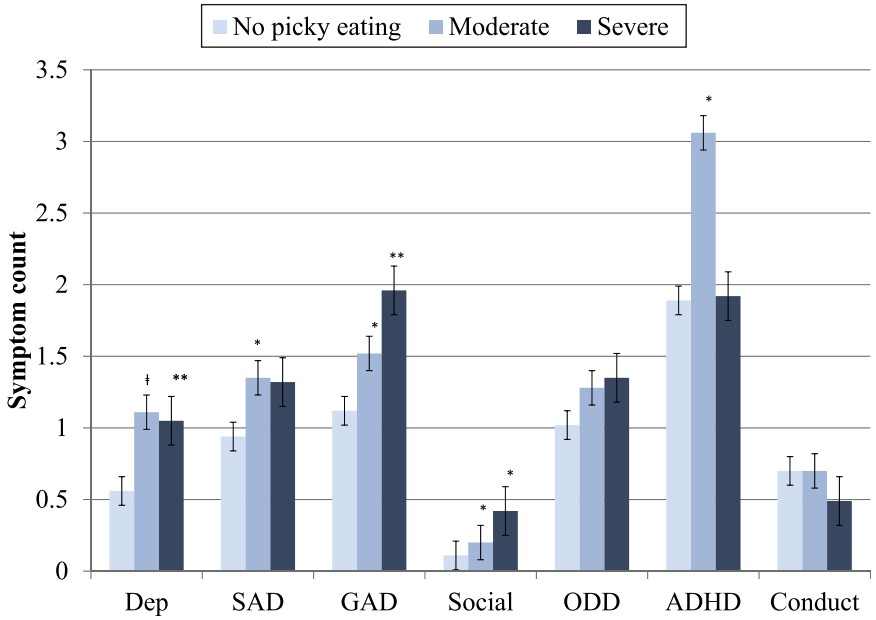

FIGURE 2

Results of weighted logistic regression models in a generalized estimating equations framework that associated severity of SE (moderate or severe) with odds of increased psychiatric symptoms. Both categories of SE were compared with the reference category (absence of SE). Moderate levels of SE were significantly associated with increased depressive symptoms (2.0; 95% CI: 1.4–2.7; $P < .001$), SAD (1.4; 95% CI: 1.1–2.0; $P = .03$), GAD (1.4; 95% CI: 1.1–1.8; $P = .02$), social anxiety disorder (1.8; 95% CI: 1.0–3.2; $P = .05$), and ADHD (1.6; 95% CI: 1.2–2.1; $P = .001$). Severe levels of SE were significantly associated with increased depressive symptoms (1.4; 95% CI: 1.1–1.8; $P = .01$), GAD (1.3; 95% CI: 1.1–1.6; $P = .004$), and social anxiety disorder (1.9; 95% CI: 1.3–2.9; $P = .002$). *$P = .05$, **$P = .01$, ‡$P = .001$. Conduct, conduct disorder; Dep, depressive symptoms; GAD, generalized anxiety disorder; ODD, oppositional defiant disorder; SAD, separation anxiety disorder; Social, social anxiety disorder.

"grow out of it." The result is that parents who present with a child's SE are often educated about normative developmental phases. The seeming focus of this strategy is to reduce parental anxiety via reassurance that this pattern will diminish with age. However, this "wait and see" stance is not consonant with other approaches to health, particularly when the data indicate that SE is associated with concurrent impairment at even moderate levels. Parents of individuals with SE indicate that they frequently feel blamed by health care providers for failing to present a sufficient variety of novel foodstuffs. However, our finding of frequent family conflicts around food suggests that parents are not merely accommodating to the child's wishes around food. Such findings highlight the need to develop interventions for even moderate levels of SE.

SE was associated with increased psychiatric comorbidity and psychiatric symptoms. Children with both moderate and severe SE demonstrated increased symptoms of generalized anxiety, social anxiety, and depressive symptoms, whereas those with moderate SE also endorsed elevated symptoms of ADHD and separation anxiety. It is interesting to consider what may be common vulnerabilities that contribute to psychiatric symptoms and food avoidance. Given our findings of enhanced sensory sensitivity, it could be that this enhanced intensity of experience makes it challenging to regulate emotions or modulate attention focus, providing a common vulnerability to disorders of eating and affective experience. Sensory sensitivity has largely been studied within the context of autism spectrum disorders.[18] However, there is increasing interest in the study of individual differences in sensory perception and the contribution of such variations in perception to the emergence of psychiatric symptoms more generally (eg, in ADHD, anorexia nervosa).[19–21] Thus, our finding of enhanced sensory sensitivity in individuals with SE in the absence of an autism spectrum disorder is notable. The manner in which sensory sensitivities relate to psychiatric symptoms is unknown; however, 1 hypothesis is that psychiatric symptoms are reactions to these intense perceptual and experiential experiences (eg, anxiety in reaction to loud noises) or, alternatively, attempts to regulate the intensity of these experiences (eg, food selectivity or a generalized need for sameness as attempts to limit sensory intensity).[22] Thus, sensory sensitivity may be an important risk factor for the emergence of pathology.[23]

Along these lines, perhaps the most clinically significant finding is that SE is a marker for later psychopathology: children with SE were 1.7 times as likely to have increased symptoms of generalized anxiety disorder at follow-up when controlling for baseline levels. Our findings are consistent with previous studies in young adolescent children that revealed increased internalizing and externalizing symptoms[2]; however, we extend these findings by examining patterns at the syndrome levels, controlling for baseline levels and examining symptoms longitudinally using a structured diagnostic interview. Using these strategies, we were able to more precisely characterize the domains of psychological function that may be affected in SE.

Our findings suggest that the term SE (or "picky eating") is now obsolete. If an individual presents to primary care with the presenting problem of SE, then impairment is implied. Such

TABLE 3 Associations Between SE Groups and Psychiatric Symptom Levels at Follow-up

	No SE (N = 137)	Moderate or Severe SE (N = 50)	Unadjusted		Adjusted for Current Status	
			OR (95% CI)	P	OR (95% CI)	P
Depressive	0.92 (1.19)	1.18 (0.91)	1.3 (0.8–2.0)	.34	1.4 (0.9–2.2)	.18
SAD	0.57 (1.18)	0.75 (0.92)	1.3 (0.7–2.6)	.42	1.6 (0.8–3.0)	.19
GAD	0.94 (1.21)	1.36 (0.99)	1.5 (1.0–2.3)	.07	1.7 (1.1–2.6)	.01
Social	0.08 (0.31)	0.09 (0.31)	1.1 (0.3–3.9)	.95	1.2 (0.4–4.3)	.76
ODD	0.74 (1.13)	0.77 (1.02)	1.1 (0.5–2.5)	.92	1.0 (0.5–2.1)	.98
ADHD	2.14 (3.23)	3.55 (3.06)	1.7 (0.9–3.2)	.10	1.8 (0.9–3.6)	.11
CD	0.28 (0.81)	0.30 (0.52)	1.1 (0.4–3.1)	.80	0.8 (0.3–2.5)	.72

Data are presented as means (SD) unless otherwise indicated. The simple model controls for time since last interview. CD, conduct disorder; GAD, generalized anxiety disorder; ODD, oppositional defiant disorder; OR, odds ratio; SAD, separation anxiety disorder; Social, social anxiety disorder.

eating patterns thus may be better characterized using the diagnostic category of avoidant/restrictive food intake disorder (ARFID), an eating disorder new to the *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition*.[24] This diagnosis is a replacement for and significant departure from the diagnosis of feeding disorder of infancy or early childhood (FD) which was part of the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition*.[25] Unlike FD, ARFID is not restricted to a certain developmental period and, as such, can be diagnosed throughout the life span. In addition, impairment in ARFID is not restricted to domains of weight gain and altered growth trajectories as in FD, which is important because a child may eat a sufficient quantity but a limited variety of foods, thereby suffering from nutritional deficiencies but evidencing sufficient weight gain and growth velocity. These individuals with SE would now be given a diagnosis of ARFID.[26]

Notwithstanding the greater sensitivity afforded by ARFID in capturing individuals with problems in eating that would previously be undiagnosed, there remains great variability in the range of clinical presentations that may fall under its rubric. For instance, the patterns of our findings between our moderate and severe SE were not just different in degree but in kind. Our moderate-SE group evidenced higher levels of ADHD and separation anxiety symptoms in addition to higher levels of maternal substance use. In contrast, our severe-SE group evidenced both more severe comorbid anxious psychopathology and oral-motor problems, although both groups had elevated sensory sensitivity. Thus, as research into ARFID advances, there may be increased precision in defining subgroups. For example, certain subgroups of individuals with disordered eating may be distinguished by deficits in executive functioning and others distinguished by oral-motor challenges.

Our results highlight some unique domains for intervention development as alternatives to the traditional focus on the role of anxiety. First, to our knowledge, this is the first study documenting parent-reported sensitivity to smell and texture in childhood SE. Furthermore, parents reported that their child had an aversion to food at both moderate and severe SE levels. The experience of aversion is an aspect of disgust experience and, as such, points to the importance of investigating the role of enhanced disgust experience, perhaps a secondary reaction stemming from enhanced sensory sensitivity, in SE.

With regard to improving the health care of children, the current data suggest the following: First, there is a need to develop interventions or provide further guidance to caregivers about the management of SE. Despite data that some children will seemingly grow out of SE without intervention, the presence of concurrent impairment warrants the development of strategies to intervene in all cases. Second,

TABLE 4 Associations Between SE Groups and Eating Behaviors

	No SE, % (N)	Moderate SE, % (N)	Severe SE, % (N)	No SE Versus Moderate SE, OR (95% CI)	No SE Versus Severe SE, OR (95% CI)	Moderate Versus Severe SE, OR (95% CI)	No SE Versus Moderate/Severe SE, OR (95% CI)
Food aversion	4.6 (31)	19.2 (39)	30.1 (15)	4.9 (1.9–12.6)***	3.0 (1.5–6.0)**	1.8 (0.5–7.3)	5.4 (2.2–13.2)***
Reduced appetite	5.0 (35)	7.6 (28)	7.0 (6)	1.6 (0.6–4.1)	1.2 (0.6–2.2)	0.9 (0.3–3.2)	1.5 (0.6–3.8)
Weight loss	1.3 (14)	2.0 (10)	2.4 (2)	1.5 (0.4–5.7)	1.3 (0.5–3.5)	1.2 (0.2–6.3)	1.6 (0.4–5.7)
Low growth	1.9 (27)	10.5 (21)	45.1 (12)	6.0 (1.9–18.8)**	6.5 (3.1–13.8)***	7.0 (1.5–31.8)**	9.4 (3.3–26.7)***
Food refusal	0.8 (2)	1.1 (6)	3.5 (3)	1.5 (0.2–11.2)	2.1 (0.7–6.6)	3.1 (0.7–14.8)	1.9 (0.3–13.8)
Hypersensitivity to							
Smell	0.1 (3)	2.7 (3)	3.6 (3)	20.6 (2.6–160.9)**	5.3 (2.2–12.5)***	1.4 (0.2–11.6)	21.7 (3.5–133.5)***
Noise	3.1 (53)	9.0 (19)	9.7 (8)	3.1 (1.1–9.1)*	1.8 (1.1–3.2)	1.1 (0.3–4.2)	3.1 (1.2–8.2)
Visual	0.1 (3)	5.1 (10)	2.5 (2)	40.5 (7.1–230.4)***	18.9 (2.8–126.9)**	0.5 (0.1–3.5)	37.3 (7.0–198.2)***
Oral textures	3.4 (39)	22.8 (41)	14.5 (12)	8.3 (3.4–20.7)***	2.2 (1.3–3.8)**	0.6 (0.2–1.8)	7.8 (3.3–18.5)***
Swallowing problems	0.9 (5)	1.2 (6)	14.9 (2)	1.3 (0.2–7.4)	4.3 (1.3–14.9)*	14.8 (1.8–120.7)**	3.4 (0.5–25.8)

*$P \leq .05$, **$P \leq .01$, ***$P \leq .001$. OR, odds ratio.

intervention development should consider unique features of SE: sensory sensitivity and aversion/disgust. Third, SE may prove a useful behavior to screen for in primary care to identify vulnerable children, given that (1) SE seems to be a vulnerability marker for the emergence of increased anxiety symptoms and (2) parents can reliably identify SE.

Our findings should be considered in light of their limitations. Our measurement of the children's eating was only via parental report. Concern with this method is somewhat mitigated by our use of structured diagnostic interviews conducted by trained interviewers. Furthermore, the exclusion of individuals with pervasive developmental disorders implies that we cannot characterize the nature of SE against this clinical background, and thus our findings may not generalize to SE in this specific clinical group. Future research should use a multimethod approach and include individuals with developmental disorders. There is much to learn about the management of SE. Findings may help health care providers better understand the complex challenges parents face when their child is a selective eater.

ABBREVIATIONS

ADHD: attention-deficit/hyperactivity disorder
ARFID: avoidant/restrictive food intake disorder
CI: confidence interval
FD: feeding disorder of infancy or early childhood
PAPA: Preschool Aged Psychiatric Assessment
SE: selective eating

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