Adolescent–Adult Discrepancies on the Eating Disorder Examination: A Function of Developmental Stage or Severity of Illness?

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ABSTRACT

Objective: Across studies, adolescents score lower on measures of eating disorder pathology than adults, but it is unclear whether such findings reflect discrepancies inherent to site/study or true developmental differences. The aim of this study was to determine whether age predicts subscale and diagnostic scores of the Eating Disorder Examination (EDE) in adolescents and adults with anorexia nervosa (AN) admitted to a single research center within the same period of time.

Method: The sample consisted of 16 adolescent and 20 adult consecutive admissions to parallel, age-specific, research-based AN treatment programs. Participants completed a baseline evaluation at admission that included the EDE, depression measures, and global assessment of functioning scales.

Results: Age significantly predicted EDE scores in univariate regression analyses. However, in multivariate models that included severity indices of general and specific psychopathology as covariates, age was no longer a significant predictor of severity of eating disorder symptoms.

Discussion: This study adds to the growing body of data showing lower scores on the EDE for adolescents with AN relative to their adult counterparts, while eliminating potential site confounds. Results indicate that the higher adult scores may be carried in part by a more overall severe and chronic general clinical profile. © 2010 by Wiley Periodicals, Inc.

Keywords: anorexia nervosa; adolescents; assessment; Eating Disorder Examination

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Introduction

The Eating Disorder Examination (EDE),[1] long considered the gold-standard assessment tool for eating disorders, was originally designed for and tested with an adult population. Of the few studies that have reported EDE subscale scores for adolescents with anorexia nervosa (AN), all have found adolescents to score lower than independently reported adult AN data.[1–5] There are at least four plausible hypotheses to explain these findings. First, AN manifestations in younger cohorts may be unique in a way that renders adolescents less likely to endorse symptoms, such as increased denial or minimization of illness[5] or less-developed cognitive capacities that limit the comprehension of abstract psychological concepts such as over-valuation of shape and weight in determining self-concept [part of the

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Diagnostic and Statistical Manual of Mental Disorders' (Fourth Edition; DSM-IV) Criterion C for AN].[6,7] Second, it is possible that the EDE is not a sufficiently developmentally sensitive tool for assessing AN pathology among youth, a concern which the Child Eating Disorder Examination (ChEDE),[8] a version for younger children, was designed to remedy. Third, the EDE may be accurately capturing the severity of AN among adolescent patients, and adolescents are in fact less ill than their adult counterparts. Finally, studies of the EDE among adolescents with AN have taken place at different research centers than those that produced adult AN EDE data, and site-based population discrepancies cannot be ruled out. Thus, it is not clear whether adolescent versus adult EDE findings reflect discrepancies inherent to site/study, to limitations in the measure itself, or to true developmental (chronological or psychopathological) differences. This study sought to examine subscale and diagnostic scores of the EDE as a function of age in adolescents and adults with AN admitted to a single research center within the same period of time, while also examining other clinical characteristics and severity indices (percent normal body weight, duration of illness, AN subtype, depression and suicidality, and global functioning) that may explain or be associated with our hypothesized significant positive relationship between age and EDE scores.

Method

Participants

The study sample was a sequential cohort of 16 adolescents (94% female) and 20 adults (100% female) with AN who presented to the Eating Disorders Research Unit of the New York State Psychiatric Institute (NYSPI)/Columbia University Medical Center for treatment studies between January 2000 and December 2004. The adolescents participated in an outpatient family-based study intervention as part of an open dissemination trial (for a detailed review of the methods and results from an overlapping set of 20 participants, see Loeb et al.[9]). Adults participated in a study of relapse prevention interventions after inpatient weight restoration (see Walsh et al.[10]). Both studies were approved by the NYSPI Institutional Review Board, and informed consent was obtained from all participants. The adolescents ranged in age from 12 to 17 (mean = 15.13, SD = 1.46) and the adults from 18 to 29 (mean = 21.75, SD = 2.99).

Procedures

All data were derived from baseline assessments at the time of study admission.

Adolescent Sample. A psychologist or psychiatrist determined study eligibility, DSM-IV AN diagnosis, and Children's Global Assessment Scale[11,12] functioning score by clinical interview with patients and parents. In addition, a research assistant or psychologist administered two semi-structured interviews, the EDE[1] to assess AN psychopathology (including dietary restraint, shape, weight, and eating concern, and the DSM-IV psychological criteria for AN) and the Children's Depression Rating Scale (CDRS-R)[13] to measure depression. The EDE has been used successfully with adolescents,[3,4,14] and, in a modified form (the ChEDE), with children and younger adolescents.[8,15–17] The ChEDE demonstrates good inter-rater reliability, internal consistency, and discriminant validity.[17] The EDE has been found to have an unstable factor structure and variable internal reliability among a large nonclinical sample of adolescents; however, in this same sample, the psychological diagnostic items discriminated between age groups and the presence of eating disorder behaviors.[14] Likelihood of depression was defined as a CDRS-R *t*-score of 65 or greater, and presence of suicidal ideation was defined as a score of 3 or greater on item 13 of the CDRS-R. Weight and height were measured on a physician's balance scale (without shoes, in single-layer clothes) to inform percent ideal body weight (IBW), calculated as current weight as a function of the weight corresponding to the 50th percentile for weight for age, height, and gender.[18]

Adult Sample. A psychiatrist evaluated participants with a clinical interview to determine study eligibility and establish DSM-IV AN diagnosis. In addition, a research assistant administered the Structured Clinical Interview for DSM-IV,[19] from which a Global Assessment of Functioning Axis V score was determined, and the EDE. Studies have demonstrated the EDE's concurrent validity,[20] discriminant validity,[20–22] inter-rater reliability,[20,22,23] and internal consistency[21,24] with adults. A research assistant measured height and weight on a physician's balance scale (without shoes, in single-layer clothes), from which percent IBW was calculated based on the 1959 Metropolitan Life Insurance tables.[25] Participants also completed the Beck Depression Inventory (BDI).[26] Likelihood of depression was defined as a BDI score of 19 or greater, and presence of suicidal ideation was defined as a score of 2 or greater on item 9 of the BDI.

Data Analysis

Data were analyzed using a standard statistical software package (SPSS Version 17; SPSS, Chicago, IL). First, a series of linear regressions were conducted with age (continuous) as the independent variable and the four EDE subscales as the dependent variables, and a series of logistic regressions were conducted with age as the independent variable and threshold status (cutoff of 4) on the four psychological diagnostic EDE items measuring fear of weight gain, over-evaluation of shape and weight, and feeling fat as the dependent variables. These models were then

TABLE 1. Univariate linear and logistic regressions with age as independent variable and EDE scores as dependent variables

Outcome Variable	β	*df*	*t*	χ^2	*p*
Subscales					
Restraint	.425	34	2.74		.010
Shape concern	.540	34	3.74		.001
Weight concern	.454	34	2.97		.005
Eating concern	.606	34	4.44		.000
Diagnostic items					
Fear of weight gain		1		3.93	.048
Importance of shape		1		5.86	.015
Importance of weight		1		2.08	.149
Feelings of fatness		1		2.38	.123

repeated as multivariate regressions by adding other severity indices with which age might be correlated (percent IBW, duration of illness, AN subtype, global functioning, depression, and suicidality), and their interaction-with-age terms, as covariates. Pearson's correlation coefficients between age and these variables were also calculated as an indicator of multicollinearity between the predictors. In addition, given the substantial clinical and research distinctions in treatment and assessment considerations for adolescents (age 17 and below) versus adults (age 18 and above) with AN, and for comparison across studies reporting separate means for adolescents and adults, descriptive data on the EDE were calculated by group, along with descriptive data on the other clinical severity indices. To explore the degree to which the EDE might have underestimated the diagnosis of AN relative to the general clinical interviews performed by psychologists or psychiatrists (see Procedures), the percent of adolescents and adults meeting the EDE diagnostic item for Criterion B for AN (fear of weight gain) and the EDE diagnostic algorithm for Criterion C (disturbance in the experience of shape or weight or undue influence of shape and weight on self-evaluation) were calculated.

Results

Age, Severity Indices, and EDE Scores

In univariate analyses, when age alone was entered as the independent variable, it significantly predicted the EDE Restraint, Shape Concern, Weight Concern, and Eating Concern subscales, as well as the diagnostic items Fear of Weight Gain and Importance of Shape (**Table 1**). However, when the severity indices (percent IBW, duration of illness, AN subtype, depression and suicidality, and global functioning) and their interaction-with-age terms were added as covariates in multivariate analyses, age was no longer significant in any of the models, nor were the covariates, with the exception of percent IBW predicting the Shape Concern subscale (β = 2.67, $t(22)$ = 2.10, p = .047). Severity markers × age interaction terms were examined because, although age was found to be a significant individual predictor, it was important to determine whether the effects of the covariates on the eating disorders outcomes varied by age. Pearson's correlations showed that age was significantly correlated with percent IBW (r = −.346, p = .039), duration of illness (r = .803, p = .000), AN subtype (coded as a binary variable with 0 = restricting type and 1 = binge eating/purging type; r = .706, p = .000), global functioning (r = −.561, p = .000), and presence of depression (coded as a binary variable with 0 = below cutoff and 1 = meeting or exceeding cutoff; r = .510, p = .001), but not with suicidality.

TABLE 2. EDE subscale and psychological diagnostic item scores by age group

	Adults		Adolescents	
	M (SD)	% ≥4[a]	*M* (SD)	% ≥4[a]
Subscales				
Restraint	4.26 (1.46)		2.24 (1.76)	
Shape concern	4.66 (1.46)		2.16 (1.73)	
Weight concern	3.72 (1.93)		1.99 (1.74)	
Eating concern	3.57 (1.46)		1.74 (1.76)	
Diagnostic Items				
Fear of weight gain	4.50 (2.40)	75	2.81 (2.66)	38
Importance of shape	5.10 (1.41)	95	3.00 (2.13)	44
Importance of weight	4.15 (2. 01)	65	2.81 (2.01)	44
Feelings of Fatness	4.45 (2.44)	75	2.94 (2.59)	38
Criterion B endorsed[b]		75		38
Criterion C endorsed[c]		95		69
Criteria B + C endorsed		75		38

[a] The percentage of participants scoring at or above the cutoff of 4 (on a 0–6 ordinal Likert scale) on the diagnostic items of the EDE.
[b] DSM-IV Criterion B for AN corresponds to EDE diagnostic item fear of weight gain ≥4.
[c] DSM-IV Criterion C for AN = (EDE importance of weight ≥4) or (EDE importance of shape ≥4) or (EDE feelings of fatness ≥4).

Descriptive EDE and Clinical Data by Group

Table 2 presents means and standard deviations by group (adolescent or adult) for the EDE subscale and diagnostic scores, as well as frequency (percentage) statistics for the EDE psychological diagnostic items (threshold ≥4). Although by inclusion in this study 100% of the patients were diagnosed with AN according to the general clinical interviews conducted, only a subset would have been categorized as full AN by the EDE. Specifically, 38% of the adolescents and 75% of adults met Criterion B for AN on the EDE (by meeting or exceeding the cutoff for the EDE diagnostic item Fear of Weight Gain), 69% of the adolescents and 95% of the adults met Criterion C (by meeting or exceeding the cutoff for the EDE diagnostic items Importance of Shape and/or Importance of Weight and/or Feelings of Fatness), and 38% of the adolescents and 75% of adults met both criteria according to the EDE (**Table 2**). **Tables 3** and **4** present descriptive sta-

TABLE 3. Severity indices—adults

	N (%)	*M* (SD)	Range	Distribution Statistic[a] (*p* Value)
Continuous variable				
% Ideal body weight		70.25 (9.42)	65.84–74.66	.139 (.200)
Duration of illness[b]		69.75 (43.88)	49.21–90.29	.092 (.200)
GAF[c]		40.65 (9.84)	36.04–45.26	.179 (.093)
Binary variables				
AN-B/P type	17 (85)			
Depression[d]	18 (90)			
Suicidality[e]	8 (40)			

[a] Kolmogorov–Smirnov test of normality.
[b] In months.
[c] Global Assessment of Functioning (DSM-IV Axis V).
[d] Percent of patients at or above a raw score of 19 on the Beck Depression Inventory (BDI).
[e] Percent of patients with a score of 2 or greater on item 9 of the BDI.

TABLE 4. Severity indices—adolescents

	N (%)	*M* (SD)	Range	Distribution Statistic[a] (*p* Value)
Continuous variable				
% Ideal body weight		78.23 (3.98)	76.11–80.35	.156 (.200)
Duration of illness[b]		17.75 (18.02)	8.15–27.35	.311 (.000)
GAF[c]		56.19 (7.03)	52.44–59.93	.189 (.129)
Binary variables				
AN-B/P type	1 (6)			
Depression[d]	4 (25)			
Suicidality[e]	4 (25)			

[a] Kolmogorov–Smirnov test of normality.
[b] In months.
[c] Global Assessment of Functioning—Children's Global Assessment Scale (CGAS).
[d] Percent of patients at or above a *t*-score of 65 on the Children's Depression Rating Scale-Revised (CDRS-R).
[e] Percent of patients with a score of 3 or greater on item 13 of the CDRS-R.

tistics for adults and adolescents, respectively, for the other diagnostic and clinical characteristics.

Discussion

The aim of this study was to determine whether age predicts subscale and diagnostic scores of the EDE in adolescents and adults with AN. Descriptive data, without direct between-group tests, showed that consistent with the published literature across sites and studies,[1–5] the adolescents with AN-spectrum diagnoses in our sample scored lower on all four EDE subscales, and were less likely to reach the diagnostic threshold for the psychological features of AN, relative to their adult counterparts. Consistent with this, when examined as a continuous variable, age significantly predicted EDE scores in univariate regression analyses. However, in multivariate models that included severity indices of general and specific psychopathology as covariates, age was no longer a significant predictor of severity of eating disorder symptoms as measured by the EDE. Age was also highly correlated with the majority of the covariates, specifically percent normal body weight, duration of illness, AN subtype, global functioning, and depression. Notably, in the literature, severity of emaciation, migration to the binge eating/purging subtype of AN, and worse mood and global functioning are all associated with increased chronicity in AN,[27,28] which is, in turn, associated with age.

The question remains whether these severity indices are correlates or mediators of increased severity in the psychological features of AN, as measured by the EDE, as a function of age. The data and literature suggest both functions. In our study, parental report, combined with expert judgment by the interviewing psychologist or psychiatrist after meeting with parents and offspring, helped inform the clinical diagnosis of AN in adolescents and bridged the discrepancies between strict EDE endorsement of Criteria B and C (analyzed in this report), which often fell short of AN cutoffs, and clinical presentation. Specifically, the clinical interview for adolescents assessed for AN Criterion B, intense fear of weight gain, by incorporating patient self-report, parent-report, and direct clinical observation, and allowing for behavioral evidence of this symptom (e.g., deliberate, rigid, extreme dietary restriction or expressions of extreme anxiety in response to being asked to consume foods that might increase weight by virtue of quantity or quality). Similarly, for AN Criterion C, the presence of disturbance in experience of shape/weight, over-valuation of shape/weight, and/or denial of the seriousness of current low weight was determined in the clinical interview by incorporating information from multiple informants and from direct observation, while allowing for behavioral evidence of these symptoms (e.g., utterances such as "I'm so fat"). Only 38% of these adolescents with clinically diagnosed AN would have been diagnosed with AN according to the EDE, whereas twice as many adults (75%) would be identified as having AN by the EDE. This finding of marked clinical/diagnostic "augmentation" to the EDE for adolescents relative to adults is consistent with Courtier et al.'s[29] results that enlisting parents and clinicians as additional informants on the EDE raises adolescents' scores significantly, as well as with House et al.'s[30] study showing better agreement between parent-informed assessment and clinical diagnosis in adolescents than between the EDE and clinical diagnosis. It also indicates that increased AN chronicity and global severity with age may not fully explain adolescent–adult EDE discrepancies. Instead, a

greater tendency for denial and minimization of illness[5,31] (particularly the psychological features of AN),[32,33] a reduced cognitive capacity for abstraction necessary to endorse the psychological features of AN,[7] and/or a lack of developmental sensitivity in the EDE may contribute to adolescents' "suppressed" scores. The ego-syntonic nature of AN, which presumably gives rise to denial of illness, is clearly a challenge in adult diagnosis as well, but seems to be amplified in younger patients. However, although enlisting additional informants and applying expert clinical judgment might raise EDE scores enough to make a difference in AN diagnosis, there remains a gap between informant-enhanced adolescent EDE scores[29] and adult EDE scores, which may be a result from an overall increase in clinical severity over time. Importantly, although adolescents were less ill than the adults in this study, they nevertheless exhibited levels of specific and associated psychopathology and impairment that warranted immediate clinical attention.

Limitations

There are a number of limitations to keep in mind when interpreting our results. From the perspective of causal inference, it is impossible to draw definitive conclusions from cross-sectional data, and only longitudinal data would elucidate our speculations about measurement of AN symptoms with the EDE in relation to global severity indices and course of illness. Second, the sample size was modest, and larger future studies may be able to provide more reliable data on EDE scores among adolescents versus adults. In particular, a larger sample size would better support the number of covariates examined in an analysis like this study's. Third, although both adolescent and adult clinical diagnoses were informed by expert judgment, collateral data from multiple informants (i.e., family members) were only elicited for adolescent patients. Finally, although the two age groups were evaluated within the same center and timeframe, age-specific study features (the adult study involved an inpatient component for acute weight gain whereas the adolescent study offered an outpatient alternative for this phase of treatment) and procedures (e.g., differences in measures) could have biased results.

Conclusion

This study adds to the growing body of literature showing developmental discrepancies on the EDE, while eliminating potential site confounds. Results indicate that higher EDE scores as a function of age may be carried in part by a more overall severe and chronic general clinical profile. However, prior research also suggests that adolescents are particularly prone to denial and minimization of illness,[5] and their EDE scores increase significantly with the additional input of informants such as parents and clinicians,[29] with potential implications for diagnosis. Thus, exclusive reliance on the standard EDE in assessing adolescents with AN presentations may obscure early identification and treatment, which are critical in determining ultimate course of illness and prognosis.

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