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Secular Trends in the Incidence of Anorexia Nervosa: Integrative Review of Population-Based Studies

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Abstract: **Objective and Method:** *Aggregating across retrospective cohort samples, this integrative review synthesizes the findings of 12 cumulative incidence studies (45 hypotheses) on anorexia nervosa secular trends.* **Results:** *(1) The female/male anorexia incidence rate ratio was estimated to be 8.20, 18.46 versus 2.25 cases per 100,000 per year,* $p < .05$*; (2) female teenagers experienced anorexia at a rate fivefold greater than other women, 50.82 versus 10.37 incident cases per 100,000 per year,* $p < .001$*; (3) no secular trend or change in the incidence of anorexia was observed among teenagers, while a near threefold increase was observed over the past 40 years among women in their 20s and 30s, 6.28 (1950–1964) versus 17.70 (1980–1992) cases per 100,000 per year,* $p < .05$*; and (4) the two cohort characteristics of age, and the age by year interaction accounted for nearly two thirds of the variability among anorexia incidence estimates,* $R^2 = .614$, $F(2,27) = 21.49$, $p < .001$*. After the two factors of age and the Age × Year interaction were accounted for, none of the other study characteristics, including study year(s), were found to be significantly associated with anorexia incidence, that is, a main effect of time was not observed.* **Discussion:** *The integrative evidence across the population-based epidemiologic studies covering 40 years in this field suggests strongly that, overall, the incidence of anorexia nervosa, particularly among those very young women at greatest risk of experiencing it, has not increased significantly. However, the risk does seem to have increased significantly among women in their 20s and 30s.*
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Key words: *anorexia nervosa; incidence; epidemiology*

INTRODUCTION

The experience of eating disorders, the most prevalent of which is anorexia nervosa among young women, has many deleterious morbid and even mortal consequences.

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Examples include feelings of isolation, depression, comorbid sexual abuse experiences, sexual dysfunctions, self-injurious behaviors including alcohol and illicit substance abuse, suicidal ideas and behaviors, and early death from a number of related health problems (e.g., Holderness, Brooks-Gunn, & Warren, 1994; Muuss, 1985; Patton, 1988; Zerbe, Marsh, & Coyne, 1993). More than three decades of research on anorexia has clearly underscored its public health importance. However, the most basic questions in this field, that is, those which are concerned with the problem's magnitude (prevalence and incidence), have not yet been unequivocally answered; incidence estimates vary widely (ranging from less than 1 to 82 per 100,000 per year) across methodologically dissimilar samples of different people and times. Previous reviews have also disagreed on incident change; one estimated that there has been no change over the past 25 years, while another estimated a significant increase during the same period of time (Fombonne, 1995; Hoek, 1993). Adding still more confusion to the issue are studies of clinical samples (inpatient and outpatient) which tend to infer the increasing prevalence and incidence of eating disorders (e.g., Eagles, Johnston, Hunter, Lobban, & Millar, 1995). Their findings, as well as those of others based on nonpopulation, self-, or other-referred clinical samples, could, in fact, be more parsimoniously explained by increased public and professional awareness of the problem, and their increasingly effective response to it through earlier identification, assessment, referral, and intervention.

This research literature balks at coherent summarization because of its extremely disparate findings; a near 100-fold difference between low and high incidence estimates has been observed across studies. Such divergent estimates of anorexia trends may be resultant from changes in a number of potentially salient factors: its true incidence, familial characteristics, environmental characteristics such as socioeconomic status, and/or methodological ones. We are unaware of any study which has empirically examined the relationship of the latter to anorexia nervosa incidence estimates. For example, what is the relationship between study contextual and design characteristics (e.g., country, cohort years, cohort ages and gender, operational definitions of eating disorders) and incidence estimates? Previous reviews have not, for example, even integratively accounted for age in their longitudinal meta-analyses. The present integrative review will do so.

METHOD

Computerized data bases were searched for studies estimating the incidence of anorexia nervosa: *Psychological, Sociological, Social Work, Nursing, and Dissertation Abstracts* as well as *Index Medicus* (1965 to the present). Searches used the following key word scheme: [anorexia] and [incidence or epidemiology]; both female and male samples from any country were included. These searches were then augmented with bibliographic reviews of relevant retrieved manuscripts. Mere case series or cross-sectional prevalence surveys as well as studies of ill defined ''eating disorders'' were excluded. Furthermore, studies of clinical or registry-based samples, without connection to at-risk populations, were excluded because historical confounders would most assuredly fatally flaw any panel comparisons of their anorexia incidence estimates. Fifty-two content-relevant studies were retrieved, of which 12 provided empirical data on anorexia nervosa incidence. These 12 population-based studies—45 independent hypotheses—comprise this integrative review's sample for analysis (see asterisked studies in the reference section). For example, a study which observed the 5-year (1970–1974) cumulative incidence of independent female and male cohorts (ages 13–19, and 20 or older) would contribute four records for

this integrative review's analysis. Aggregating their 45 independent samples across categorically similar studies, incidence estimates were compared across study contextual and design characteristics.

RESULTS

Sample Description

This review's sample of 12 studies (45 hypotheses) on the incidence of anorexia nervosa arose primarily from U.S. (49%) and Dutch (22%) populations during the past nearly 50 years; data were collected from 1950 to 1992, *Mdn* = 1972 (see Table 1). Most of the aggregate study samples were female (80%) and quite young (*Mdn*= 21 years of age). This epidemiologic research emphasis on young women is not surprising given their known greater prevalent experience of a variety of eating disorders. All of the studies were retrospective cohorts—cumulative incidence studies—which ranged from 2 to 50 years duration (*Mdn* = 5 years) and typically ascertained a relatively small number of cases (which ranged from 1 to 166 cases, *Mdn* = 15).

Table 1. Descriptive profile of the reviewed study's 45 samples

	Samples	
Study Characteristics	*n*	%
Country		
United States	22	49
Holland	10	22
Great Britain	5	11
Others[a]	8	18
Gender		
Female	36	80
Male	9	20
Age (median)		
15–18	13	35
19–24	12	32
25–30	12	32
Year data collected (median)		
1950–1964	15	33
1965–1979	15	33
1980–1992	15	33
Number of cases ascertained		
1–10	14	34
11–20	13	32
21–166	14	34
Conceptual definition		
Anorexia nervosa	38	84
Bulimia	7	16
Operation definition		
DSM based[b]	28	62
Record based[c]	17	38

[a]New Zealand (3), Switzerland (3), and Israel (2).
[b]DSM-III (11), DSM-III-R (14), and DSM-IV (3).
[c]Clinical diagnosis (criteria not necessarily specified) abstracted from medical records.

Incident eating disordered (anorexia nervosa or bulimia) cases per 100,000 at-risk population per year among female and male samples are displayed in Table 2. It should be noted that some of the cohort studies of anorexia concomitantly reported on the incidence of bulimia; for the sake of complete data integration, both are reported in Table 2. Aggregating across study samples, the female/male incidence rate ratio was 8.20 for anorexia (respectively, an average [mean] of 18.46 vs. 2.25 cases per 100,000 per year; interpretable as an eightfold greater incidence among women) and 36.00 for bulimia (28.80 vs. 0.80), both $p < .05$. This description of incident gender differences is certainly consistent with other extensive primary research in this field. The systematic replication of this known relationship with this integrative review's aggregate data set bolsters confidence in its validity.

Secular Trends in the Incidence of Anorexia Nervosa

The principal findings of this integrative review concerning the secular trend of anorexia nervosa among women are displayed in Table 3; there were insufficient male end-points for their valid synthesis. Age-specific rates indicated that among teenagers (i.e., six exclusively teenage [ages 13–19] cohorts), the incidence of anorexia is approximately fivefold greater than the rate found among all of the other cohorts of women 20 years of age and older; respectively, 50.82 versus 10.37 per 100,000 per year, $F(1,28) = 44.03$, $p < .001$. Again, this finding replicates a well-known association of age with anorexia, and underscores the importance of accounting for age in any epidemiologic or other analysis in this field. With this in mind, the observation of incidence rates over time periods was accomplished separately for teenage and older female cohorts; a significant interaction or effect modification was observed, $F(1,28) = 11.27$, $p < .05$ (see bottom of Table 3). No secular trend was observed among teenagers; their rates were relatively high 40 years ago, and they remain as high today (actually a nonsignificant 10% increase was observed). Among older women (18 of the 24 such cohorts were of women in their 20s or 30s), a clear secular trend was observed. during the past 40 years, the incidence of anorexia among them has increased nearly threefold; 1950–1964 versus 1980–1992, respectively, 6.28 versus 17.70 incident cases per 100,000 per year.

Next, a multiple linear regression with each study's estimated anorexia incidence as the criterion was run among the female samples. Together, the two cohort characteristics of age and the Age × Year interaction accounted for nearly two thirds of the variability among anorexia incidence estimates ($R^2 = .614$; force entered Age × Year interaction explained 46% of the criterion variance, followed by age which explained the remaining 54%); $F(2,27) = 21.49$, $p < .001$. In fact, after these two factors entered the linear regression

Table 2. The incidence of anorexia nervosa and bulimia among female and male samples

Type of Eating Disorder	No. of Samples	Incident Cases per 100,000 per Year			
		Female		Male	
		M	*SD*	*M*	*SD*
Anorexia nervosa*	30/8	18.46	21.05	2.25	2.63
Bulimia	6/1	28.80	29.71	0.80[a]	0.00

[a]Based on only three ascertained cases.
*Gender comparison significant at $p < .05$ (one-way ANOVA and χ^2 test [*Mdn*-break]).

Table 3. The incidence of anorexia nervosa among female samples by study cohort characteristics

Characteristic	No. of Samples	Incidence / 100,000 / Year	
		M	*SD*
Age**			
Teenagers	6	50.82	22.55
20s or older	24	10.37	10.32
Age by year			
Teenagers			
1950–1964	3	49.23	24.67
1965–1979	1	48.60	0.00
1980–1992	2	54.30	35.78
20s or older*			
1950–1964	8	6.28	5.85
1965–1979	7	5.61	6.00
1980–1992	9	17.70	12.35

*$p < .05$.
**$p < .001$.

model, none of the other study characteristics (year of data collection, country, sample size, operational measure of anorexia nervosa used) entered.

DISCUSSION

Interpretation of the extant body of research on the incident secular trends of anorexia nervosa ought to be accompanied by extreme cognizance of study characteristics. The two study cohort characteristics of age and the Age × Year interaction account for nearly two thirds of the variability among reported outcomes on estimated anorexia incidence. In fact, the trend of increasing anorexia previously observed by some, particularly clinic or hospital-based studies, may be a mere artifact, a function of any number of plausible factors, for example: Greater professional awareness with enhanced case identification, and perhaps concomitant greater public awareness of the problem with diminished stigma and so, enhanced self and family referrals.

All of this integrative review's findings ought to be confirmed (or refuted) with primary research (Cooper, 1989). Not a single, large, population-based epidemiologic study has yet been reported in this field's peer-reviewed press; the largest extant study observed 166 cases, while the typical one (median) observed only 15. Such a study is sorely needed. While it is true that such a study, employing procedures to sample multiple regions of a country for example, and perhaps even with some prospective elements, would be relatively expensive, its resultant information value may be expected to exceed that of all 12 previous studies in this field combined. As with any field of practice, as methods develop and are implemented, valid baselines are needed to rigorously assess related policies and programs. An epidemiologic strategy for knowledge building about a disease / problem typically follows the following linear strategy: (1) frequency, (2) distribution, (3) correlates / determinants, and (4) treatment. Concerning the research agenda on anorexia nervosa, from a practical standpoint, to take pause, go back, and validly answer Level 1 questions concerning frequency (incidence) would go a long way toward facilitating effective practice as well as other research in this field.

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