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The Epidemic of Anorexia Nervosa: Myth or Reality?

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1. Introduction

Anorexia nervosa (AN) is an eating disorder (ED) characterized by a severe weight loss due to inadequate food intake, and has associated significant medical and psychological sequelae (Bulik et al. 2005; Torres & Guerra, 2007). Despite the fact that AN was only recognized as a mental disorder during the 20th century, there are a great number of studies about this disease. A mixture of curiosity and concern justifies this attention given by both researchers and the community at large.

One of the most explored areas in AN research is the epidemiology, specifically, the estimation of the prevalence and incidence of the disease. The incidence measures the strength of occurrence of a disease and is defined as the number of new cases in the population over a specific period of time (usually 1 year). It is commonly expressed in terms of cases per 100 000 persons in the population per year. The prevalence is the total number of cases in the population, and is calculated for a specific point in time (point prevalence) or period of time (period prevalence). This rate indicates the percentage of the population that presents with the disease (Garb, 1996; Hoek, 2006).

The application of epidemiological methods to ED research began approximately 40 years ago and was motivated by the speculation of a marked increase in AN. The hypothesis in growth of AN has been bolstered by the increase in hospital admission rates, which have been variously defined as a 'slight rise' (Russell, 1985) to an 'epidemic scenario' (Epstein, 1986, as cited in Williams & King, 1987). Conversely, other researchers argue that there is no evidence to support an increased rate of this pathology (e.g. Fombonne, 1995; Williams & King, 1987).

Several methodological limitations are the basis of these inconsistent findings which should be considered when we intend to discern whether or not the rates of AN increase over time.

In this chapter we will analyze relevant, published epidemiological studies in order to better determine the extent of this eating pathology. Relevant articles in English and Portuguese were collected from PubMed and reviewed, independent of publication year and the sample

studied. Metaanalytic studies were also included. Key search terms relating to epidemiology and ED were used. Follows is a review the main obstacles in this field, as we believe they strongly contribute to the main discrepancies found in the results.

2. Obstacles in the study of epidemiology

In spite of considerable efforts, researchers have faced several methodological problems in the study of incidence and prevalence of AN. These obstacles draw into question the validity of many studies and have left fundamental questions unanswered (Hoek & Hoehen, 2003; Hoek, 2006). These difficulties can be grouped into three broad categories: 1) sample selection; 2) definition of a case; and 3) detection of cases.

2.1 Sample selection

AN is an uncommon disease. In order to attain a larger number of people with AN, some studies selected samples from persons at increased risk of having an ED, such as students. Likewise, data on patients attending hospital services have also attracted researchers' attention (Patton & King, 1991). Consequently, there are a variety of samples studied, including graduate and undergraduate students, participants recruited from health settings (either primary health care or mental health services), as well as people from the community (Heatherton et al. 1995). These different criteria implemented in sample selection limit the ability to compare data between studies and generalize the outcomes to the general population.

Furthermore, it should be noted that there is a little use of randomized samples in the reviewed research. Considering the existence of risk groups for ED, sampling procedures should be carefully defined, to increase validity and reliability (Heatherton et al., 1995).

2.2 Definition of a case

For these reasons it is important to understand the diagnostic criteria applied in the definition of a "case" of AN in epidemiological studies. Review of these studies clearly reveals variation in diagnostic criteria between studies and countries, as well as over time.

Obviously, these differences can produce fluctuations in prevalence rates. On the other hand, even when the diagnostic criteria are defined, the researchers may use different degrees of accuracy in criteria application (Fombonne, 1995). Regardless of the discussion on advantages/disadvantages of being flexible in the application of diagnostic criteria in clinical settings, it must be stressed that the non-uniformity of their use interferes in the counting of cases, and consequently, represents a serious obstacle in the definition of a trend (increasing, decreasing, or constant) in the epidemiology of AN.

Some authors have argued for the use of homogeneous criteria in epidemiology research, specifically adapted for the study setting. Szmuckler (1985, p.144) justifies this need: "Criteria for the diagnosis of AN developed in a hospital setting achieves a reasonable degree of precision, but in a community setting, distinctions between those affected and those unaffected become less clear. With features such as weight loss and the characteristic psychopathology, the evidence points to graded severities".

Sharing this point of view, several epidemiological studies have included partial AN cases (formally considered as an ED not otherwise specified) in their analyses, arguing that they can also provide useful information about causal factors (Hardy & Dantchev, 1989; Heatherton et al., 1995; Patton et al., 1990; Råstam et al., 1989). More recently, Dellava et al. (2011) have illustrated the impact of using broad diagnostic criteria for AN on results. Specifically, that inclusion of individuals with more 'normal' BMIs may disguise key underlying factors for a BMI characteristic of AN. As such, interpretation of cited outcomes warrants some caution, as the relationship between full and partial syndromes is not clearly known.

2.3 Detection of cases

The difficulty in detecting cases is another practical problem which underlies the epidemiology of ED. One issue that contributes to this is the compatibility of AN with the cultural value placed on slimness. In occidental societies, this disease may not be detected, particularly during its early stages, because of its semblance to non-pathological dieting. Both dieting and exercise constitute well accepted behaviors of everyday lifestyles which are heavily promoted by media (Jones et al., 1980).

Another problem that hinders the detection of cases, mainly in research focused on hospital records, is the resistance of individuals with AN to seek treatment (Hoek, 2006). Due to the egosyntonic nature of symptoms, people with this disease often desire to maintain a low weight and, for this reason, avoid professional help (Preti et al., 2009). Thus, the number of patients that seek treatment does not correspond to the actual number of cases existing in the community.

On the other hand, community surveys also face problems that limit the detection of cases. The major difficulty is related to the relatively low base rate of the disorder, which requires large study samples in order to obtain an accurate measure of incidence and prevalence (Wakeling, 1996). Other great obstacles are inherent in the use of self-report measures, and understandable for several reasons. First, assessment instruments are developed according to diagnostic criteria defined in clinical settings, and thus not adequately adapted to community settings, as previously reported. Second, these studies depend on participants' self-reported answers to identify core symptoms of the disease, some of which are difficult to identify and interpret. For example, the amount of food eaten and disturbances in the way in which one's body weight or shape is experienced are two subjective and complex issues to assess. Third, data from self-report measures may be easily biased due to outliers or missing answers (Fairburn & Beglin, 1990). Similarly, the literature reveals that ED are over-represented in non-respondent participants which leads to a low prevalence estimation (Santonastaso et al., 1996). In a low prevalence pathology, as with AN, it is not necessary to have a wide range of missing data to distort the epidemiological data (Hardy & Dantchev, 1989).

In conclusion, the singular use of these assessment methodologies presents some gaps. In the following sections we will analyze the methodological options adopted by several authors to balance these limitations.

To this point we have discussed the main obstacles in achieving reliable epidemiological data in AN. It could sound peculiar starting, rather than ending, this chapter focusing on the

limitations of the studies in this domain. However, the purpose of this approach is to prepare the reader to critically analyze the studies that will be hereafter described, and to better understand the inherent difficulties that make comparisons of the outcomes a difficult task.

3. Types of studies

As a result of over 40 years in epidemiological research of ED, it is possible to find a great variety of study designs. Describing each of them would be an exhaustive task, and probably futile for the reader. Therefore, in this section we propose to highlight several studies that have been recognized by the research community as central; and also consider the multiplicity of achieved results and/or methodology implemented. These will be presented alongside a historical background about epidemiological studies in AN.

We will begin with the studies implemented with clinical samples, splitting them between those which found evidence of an increase in cases of AN and those which contradict this trend. Secondly, we will review the research developed with non-clinical samples: studies with students and community surveys. We will stress the different methodologies as well as main conclusions.

3.1. Studies with clinical samples

The first analyses in the study of the epidemiology of AN were on the rates of hospital-based services, centered on the assumption that most of the individuals with this disease would be referred to health units at some point-in-time (Wakeling, 1996). Following this clinic-based methodology some researchers concentrated analyses to psychiatric units, while others adopted a more comprehensive approach, exploring general hospital reports in a circumscribed area in order to find cases of AN that could have been treated by other medical specialties.

With the aim of providing a clear overview of the studies reviewed in this field, particularly those which concern incidence rates, specific data from each are synthesized in tables, which can be consulted in the Appendix. Tables 1 and 2 display the incidence results, and describe the studies that report an increase in the incidence (table 1) and those that do not confirm this trend (table 2), respectively. For convention, incidence rates are estimated for a period of one year, unless otherwise specified. Table 3 presents the prevalence rates obtained from clinical samples. In the following sections we will briefly discuss these tables, concentrating on the most relevant outcomes provided.

3.1.1 Indicators of an increase of AN

Historically, Theander (1970) was a pioneer in analyzing the hospital admission data, including both psychiatric and general medical services. He evaluated the incidence of AN in Sweden over the period from 1930 to 1960 and noted a sharp increase in incidence during those three decades. In subsequent years other researchers have followed his line of inquiry in greater depth, analyzing psychiatric records from several hospitals (Jones et al., 1980; Kendell et al., 1973). Commensurate with Theander's (1970) results, it was reported that the number of cases of AN had increased the decades between 1960 and 1980.

Several explanations have been assigned to this event, most of them relating to the value placed on diet: 1) the concern about losing weight had been rising in the population; 2) the significant growth of the weight-loss industry; and 3) the popularity of books about diets. However, the validity of this conclusion is questionable, as the increase in reported cases of AN could also reflect a more efficient means of case detection, reflected in the increase of articles published since 1970 (Jones et al., 1980).

Thenceforward, studies were developed in an attempt to control confounding variables that could contribute to an apparent increase of this disease. One of many such studies was developed by Willi and Grossmann (1983) in a 20-year retrospective study that found a significant increase (.38 to 1.12 per 100 000) in cases of AN between 1956 and 1975, in Switzerland (see table 1 in Appendix). The authors surmised that this increase was not attributable to the use of non-standardized diagnostic criteria, or from hospitalization of the most severe cases in the first sampling periods of the study.

Another study, by Eagles et al. (1999), assessed the possible causes of the 5.3% increase in the incidence rates in Scotland between 1965 and 1991, as reported in an earlier work by Eagles et al. (1995). Eagles et al. (1999) concluded that this rise was not due to an increase of extreme cases presenting to specialist services. Despite this result, the hypothesis that people with AN are becoming more readily identified due to growth in professional awareness is still openly stressed by several authors (Eagles et al., 1999; Munk-Jørgensen et al., 1995; Pawluck & Gorey, 1998).

Of all studies described in table 1, the works developed in Rochester, Minnesota should be highlighted as well. They provide prospective data in 55-year trends on the incidence of AN within a single community, using consistent methodology. The researchers screened approximately 30 diagnostic terms referring to undetected cases in the epidemiological archives at the Mayo Clinic, and in medical records from other healthcare providers in the surrounding geographic area. The first analysis reported on a 45-year period (1935-1979) and suggested surprisingly high incidence rates (overall age- and sex-adjusted of 7.3 per 100 000 person-years). No significant long-term trend in rates was ascertained in this study. Instead, it was suggested the existence of different trends according to specific age groups (Lucas et al., 1988).

A closer look at specific age ranges revealed the population most at-risk was also responsible for the spike in incidence rates up through 1984 (Lucas et al., 1991). A peak incidence was observed in people between the ages of 15 and 19, which contributed to the remarkable increase in incidence rates for women between the periods of 1950-1954 (7.0/ 100 000 per years) and 1980-1984 (26.3/ 100 000 per years). It is noted that the incidence rates for 20-year-old women remained constant. Lucas et al. hypothesized that this increase would not continue, or if it were to persist it would do so on a lesser scale. They were convinced that AN had reached its peak in the early 1980s, with evidence that while the milder forms of the disease in adolescents had been increasing, the more severe forms of the disease had remained constant. These authors also noted a cyclic trend in the incidence rate which coincided with changing fashion and idealized body image, which may affect the more vulnerable subjects.

These results were replicated by Lucas et al. (1999) using updated incidence rates, and adding the new cases diagnosed with AN from 1985 through 1989. The upward trend in

incidence rates was still observed in adolescents 15- to 19-year-old, as well as a noted rise among 10- to 14-year-old females between 1950 and 1989. The overall age-adjusted incidence rate was 15.0/ 100 000 per years among females, and 1.5/100.000 per years among males.

A comparative analysis of the previous 50 years' research has revealed continuance of the linear increase for 15 to 24-year-old females, possibly because of the vulnerability of this age group to social and psychological pressures (Lucas et al., 1999). In 1985 the estimated prevalence of AN among 15 to 19-year-old girls in Rochester was 0.48% (Lucas et al., 1991). This makes AN a relatively common disorder among young females (Lucas et al., 1999). In males the scenario was reportedly quite different. As the occurrence of AN in males was both rare and constant over the 55-year period, Lucas et al. (1999) stressed that sex and age groups must be considered separately.

The quality of Lucas' team's studies has been recognized throughout the scientific community, as they addressed some of the limitations frequently identified in epidemiological studies. Fombonne (1995) applauded the prospective nature, consistent diagnostic criteria, and the relatively large sample of cases obtained within and across these three studies. Additionally, he enhanced the estimation of adjusted and standardized rates. Despite these strengths, Fombonne pointed out several limitations, such as overlapping age groups, and the need to control for the differential migration into the area of study.

3.1.2 Indicators against the increase of AN

In our point of view, the majority of research invalidating the increase of AN date from a more recent period (see Appendix- table 2). One of the first studies we found in this vein was published in 1987 and observed a rise in the number of first-time psychiatric admissions in England, between 1972 and 1981. From the authors' analysis of the age-period-cohort effect, Williams and King (1987) concluded that this was not a significant increase in cases of AN.

These authors argued that longitudinal incidence data are subject to these three effects. Specifically, they suggested that the age effect is related with possible changes in the structure's population, such as the rise in the number of citizens in a specific age group, relative to the rest of population. The period effect is associated with specific characteristics inherent in the study period. For example, if vigilance with regard to the detection of AN had increased in some period, or if the methods of case detection had improved, or if the diagnostic criteria had changed during said time, these particularities would influence the number of the detected cases. The cohort effect is connected to the community's features, in other words, it is the result of being born in a particular time and place. This effect makes the community members susceptible to cultural influences typical for that period, such as the emphasis on slimness.

Examination of data on patients admitted to psychiatric facilities in the Williams and King (1987) study revealed that the upward trend in incidence rates was due to an increase of young women in the population (age effect). Another factor that may have contributed to this apparent increase was the rise in readmissions of women with anorexia. In light of these findings, Williams and King argued that the idiom "epidemic" was inappropriate to describe the trend in the incidence of AN.

Later, in New Zealand, Hall and Hay (1991) controlled for the additional effect of the availability of services. Using clinical interviews, another case detection method described by Williams and King (1987), results suggest that the number of patients with AN increased when the treatments became more accessible. When they controlled for the age effect it was found that the morbidity of this disease had not increased. Consequently, the goal of treatment dispersion was established.

Some years later, Hoek et al. (1995) improved upon this case detection method in a continuation of his investigations from the mid '80s (Hoek, 1991). This schema was implemented with primary care and general practitioners who were trained by the researchers to observe core symptoms in ED. Clinicians were provided guidelines, which included strategies to circumvent the common obstacle of disease-denial on the part of the patient. With this methodology, a representative sample of the Dutch population, roughly 1%, was assessed for AN symptomology.

In the baseline study (1985-1986), Hoek (1991) observed a point prevalence of 18.4/ 100 000 and an incidence of 6.3/ 100 000 cases per year, without defining an evolutionary trend[1]. In the three subsequent years, Hoek et al. (1995) observed a higher incidence rate of 8.1/ 100 000 cases per years. However, an overall analysis of these and other studies led the authors to conclude that there was insufficient evidence of an increasing risk of AN during the 1980s compared to the 1970s.

Commensurate with these studies, more recent research by Currin et al. (2005) also reported a stable increase in the incidence of AN between 1988 and 2000. Currin et al. limited their search for new cases of AN to primary care services in the UK. They estimated an age- and sex-adjusted incidence rate of 4.7/ 100 000 for the year 2000. When compared with the work of Turnbull et al. (1996), it was similarly concluded that the incidence of AN remained stable from 1988-1993 with an incidence rate of 4.2/ 100 000 cases in 1993. Currin et al. (2005) concluded that this disease remained remarkably consistence over the 12 years of the study duration.

In summation, after thorough review of the clinical research, we consider a position either for or against the increase in incidence of AN as speculative. The research, despite inclusion of longitudinal data sets[2], presents several limitations. In addition to the obstacles discussed earlier, two additional problems warrant discussion. The first being selection bias: the cases described in medical reports only represent self-selected people who seek treatment. According to previous studies, only 60% of individuals with AN were admitted to hospitals (Joergensen, 1992), and one-third of the people who meet stringent diagnostic criteria were treated in mental health facilities (Hoek, 2006). Thus, it is likely that the rates calculated from medical record reviews constitute an underestimation of the disease within the community (Hoek, 2006).

Secondly, information from medical histories is not standardized and varies by site. This may limit the availability of relevant and necessary information about core eating disorder-related symptoms (Fombonne, 1995). Few researchers have broached this limitation (Eagles et al., 1995).

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[1] For this reason Hoek's (1991) study was not included in tables 1 or 2, as these tables are organized according to incidence trends. Results are presented in table 3, with prevalence rates.

[2] Dating back to 1930 (Fombonne, 1995).

In addition to these limitations, few studies have examined the incidence of AN over long periods of time, within a defined geographic region(s), and using standardized methodologies (e.g., assessment tools, diagnostic criteria, etc; Eagles et al., 1995; Lucas et al., 1999). Furthermore, the analysis of incidence trends over the last ten years using said methodology is even more scarce. One of the studies which implemented these criteria was conducted over a 40 -year period (1956-1999), in Switzerland (Milos et al., 2003). This study showed oscillations in incidence rates over the duration of data collection[3]. For instance, between the 1960's and 1970's there was a significant increase in reported rates of AN, but since then the rates have remained stable. In the authors' opinion, whether this punctual increase in rates reflects changes in society's response to AN or true changes in incidence is an unanswered question. The validity and reliability of this research are widely accepted in research community, and a gold-standard for eating-disorders research (Pike, 2004).

3.2 Studies with non-clinical samples

This section will focus on epidemiological studies of AN conducted on non-treatment-seeking samples. These include research on students as well as community-wide surveys. Results are summarized in tables 4 and 5 in the Appendix, respectively.

It is noted that the studies with non-clinical samples appear to favor using *prevalence* data of AN, opposed to the *incidence* rates reported in clinic-based research. This distinction may be due to the necessity of conducting research in a specific geographic area, with prolonged access to patients over several years, and less financial resources; all of which are necessary for analysis of trends in incidence rates.

3.2.1 Studies with student samples

Research with student samples have primarily adopted three distinct approaches: 1) use of the *key informant*, which requires the collaboration of school personnel for release of demographic and health information (e.g., student's weight); 2) *research based on self-report questionnaires*, which allows gathering data on a large scale and the ability to parse-out the more severe cases; and 3) the *two-stage survey*, in which the students undergo initial screening with a self-report questionnaire and researcher-identified high-risk subjects are subsequently interviewed in person to assess eating disorder-related symptoms. The two-stage process is the most commonly accepted method (Patton et al., 1990).

3.2.1.1 The key informant method

This method is the most economical in terms of time, personnel, and financial resources; however, it presents rather significant problems. The first is the sole, observable, criteria of weight loss, a limitation inherent to the field of ED research (Patton & King, 1991). Assessment is also subject to the buy-in and motivation of the informant, all of which may present bias.

With so many confounding variables, it is no wonder that we have few studies implementing this approach. The one most cited in the literature is that by Crisp et al. (1976), conducted in England. Data was collected from nine groups of school girls who

[3] For this reason this study is presented both in table 1 and 2, according to the results for each time period.

attended both public and private institutions. Informants included both teachers and health professionals who were trained to identify cases of AN. In the majority of cases, identified students had previously been referred to and/or received medical attention.

Prevalence reported was roughly 1 girl with anorexia per 200 female students. The number of cases detected differed greatly between schools; and private schools presented higher rates than their public counterparts (1% versus 0.2%, respectively). It should be noted that this prevalence rate was similar to the incidence rates reported by Joergensen (1992) (see Appendix - table 3). It was concluded that AN is a common and serious disease within the English, female, school-aged population, and broke ground for other population-based inquiries.

Despite the large number of girls surveyed (N=12391), Szmukler (1985) criticized Crisp and colleagues' convenience sampling, and argued that participant selection was made based on school personnel's knowledge of student's medical outcomes.

3.2.1.2 Studies based on self-report questionnaires

This method allows for sampling greater numbers of people than does the use of key informants. It is also easier to obtain informed consent, expedient, and generally well accepted by participants. Here, too, we are confronted with the limitations of using a single instrument for assessment, such as the frequent false positives and high rates of missing answers, as previously discussed in section 2.3 of this chapter. Beyond these, the relative paucity of external validation data about self-report-screening questionnaires limits their generalizability (Keski-Rahkonen et al., 2006).

In the United States, Haetherton et al. (1995) tested the efficacy of mailed self-report questionnaires. They sent the "Eating Disorder Inventory" (Garner et al., 1982) via post to randomly selected students from a college in the Northeastern US. No cases of AN were identified using this method. Similar methodology was also used in Portugal, with estimated rates of AN between 0% (Dixe, 2007; Machado et al., 2004) and 0.4% (Carmo et al., 1996) in females. This is somewhat lower compared to rates reported using other data collection techniques.

In brief, self-report questionnaires provide relevant data about the population's eating patterns, but the interpretation of results requires some caution. The two-stage survey, which utilizes an interview, emerged with the intent to overcome these shortcomings.

3.2.1.3 Two- and three-stage survey

The need for both screening (via self-report) and diagnostic steps (via clinical interview) by qualified individuals is now widely accepted in the research community. Several studies report a substantial number of individuals scoring above the measure's cutoff points which places them in an at-risk category, but that subsequent diagnostic criteria for AN are not met (Johnson- Sabine et al., 1988; Whitaker et al., 1990).

Despite the thoroughness of the two-stage survey, its efficacy is still dependent on the quality of the instrument used (Fairburn & Beglin, 1990). Clinical interviews are a commonly used tool to control for this limitation; minimizing false positives and reaching a more complete analysis of eating behavior changes (Heatherton et al., 1995). To decrease the high number of subjects incorrectly labeled as not having AN symptomology (false negatives) (Rodríguez-Cano et al., 2005) and to control for the predisposition of people with

AN to hide their symptomology (Peláez Fernández et al., 2007), it is highly important for researchers to use control groups. The control groups are deemed "not at-risk" by receiving scores below clinical cut-off on the questionnaire of choice.

In persons with AN, the two-stage survey has been implemented in female adolescents –the population group most at-risk. The first published studies employing a two-stage survey on teenage girls had two common outcomes: 1) a reduction in the number in detected cases of AN, and 2) the frequent corroboration of partial AN syndrome, compared to studies using treatment-seeking samples. In fact, several surveys did not identify any anorexic participants from among the study participants (Jonhson-Sabine et al., 1988; Mann et al., 1983; Patton et al., 1990), as shown table 4 (see Appendix).

Subsequent double-stage prevalence studies, with identification of false negatives, have shown higher prevalence rates. Specifically, at the beginning of the century in Spain, the estimated prevalence of AN in female students between the ages of 12 and 18, was 0.45% (Rojo et al., 2003). A study completed only four years later in the same country, however, reported a decreased incidence of 0.33%, likely due to the inclusion of females up to 21 years of age (Peláez Fernández et al., 2007). In Portugal, female students between 12 and 23-years-old, have a purported prevalence rate of 0.39% (Machado et al., 2007) – similar to that reported by Peláez Fernández et al. (2007).

Higher prevalence rates have also been reported in studies using so-called "three-stage" surveys. These employ the two-stage model with the addition of a third stage –a review of medical records for a defined geographical area, on the same age-group as in the first two phases. One of the precursors to the three-stage survey was work done by Råstam et al. (1989). Their work has attracted attention not only because of the high prevalence rates reported, but also for the innovative methods applied to at-risk group selection (the first stage). Their methodology began with a review of school health records for individual growth charts from all 15-year-old residents in Göteborg (Sweden) enrolled in school. In addition, students completed a brief questionnaire covering topics including food interests, desire to lose weight, and menstrual irregularities. Results from these two procedures were examined by one clinician. After review, school nurses confirmed the weight of the students who presented symptoms compatible with a diagnosis of AN; and reported others students, not detected in this first phase, who might raise suspicion of suffering from this disease. In the second stage, the selected high-risk group of students underwent a neuropsychological examination and their parents were interviewed by the same clinician. The third stage in the identification process included a search of the town's pediatric and child psychiatric clinics for any additional cases that may have been overlooked in the schools. The analysis of medical case registers were conducted with same-age peers who resided in the same geographic area. The prevalence of AN in this study for girls 15-years-old or younger was 0.7%. This result is nearly double those estimated by the two-stage process. This rate is, however, comparable to the key informant methodology reported by Crisp et al. (1976). Råstam et al. (1989), hypothesized that peak incidence of AN may occur around the age of 14.

Rathner and Messner (1993), as well as Santonastaso et al., (1996), are two more current groups to employ the three-stage model. Rathner and Messner (1993) reported an impressive 1.3% population prevalence in female students aged 15-20 years. These authors proclaimed the advantages of the three-stage procedure: "In our own study this stage led to the detection of a new case and shows that some cases may be missed even with a rigorous

two-stage procedure and the application of various indices. The results of our third stage suggest that (...) all subjects of a pre-defined sub-risk group should be interviewed and, additionally, that a case-register stage should always be added to any further studies" (Rathner & Messner, 1993, p.182).

Despite this suggestion the three-stage methodology did not propagate. At present, the two-stage screening approach is the most widely used procedure in epidemiological studies, also having been adopted in community survey use. Even so, they too have their limitations. The poor response rates, the low sensitivity, lack of specificity in the screening instruments, and the small number of the interviewed participants considered sub- risk, are some of the more common methodological problems cited (Hoek, 2006).

3.2.2 Studies with community samples

Community surveys have proliferated in the last decade. The main reason for this phenomenon is the recognition that they provide a more accurate prevalence rate of AN. Clinical samples represent only a minority of the people with AN existing in the community. On the other hand, population-based data may be useful in adjusting the more meaningful features of ED, which may differ from clinical to community setting. In addition, whether the fluctuation over the incidence rates is due to cohort-effects is another issue that may be clarified in these studies.

In addition to quantifying the occurrence of AN, population studies can also provide data on the distribution of the age-of-onset, natural course, and medical outcomes of this disease (Faravelli et al., 2006; Hudson et al., 2007). For this reason, *lifetime prevalence* is often reported. It represents the proportion of persons in a sample of the population that at some point in their life (up to the time of assessment) have experienced a disorder. Considering that point- and period-prevalence only include cases identified at a specific period of time it is expected that lifetime prevalence identifies a larger number of cases and, consequently, presents a higher rate (Robins et al., 1984). Lifetime prevalence rates observed in various studies with community samples can be seen in table 5 (see Appendix).

One interesting finding that emerges from the analysis is the emphasized importance of the interview in the more current publications. The two-stage methodology continues to be implemented (cf. Hudson et al., 2007; Lahortiga-Ramos et al., 2005) but in some cases the interview is integrated in the first stage of the screening (cf. Faravelli et al., 2006; Preti et al., 2009). Other works have adopted the clinical interview as a main procedure, applying it to the whole sample (cf. Favaro et al., 2003).

Three main features can be identified as differentiating factors among community-based surveys. One of them is the geographic area covered. Most of the studies select participants from a limited geographic area, most often in an urban area (cf. Faravelli et al., 2006; Favaro et al., 2003; Lahortiga-Ramos et al., 2005; Robins et al., 1984); while others use larger, nationally representative community samples (cf. Ghaderi & Scott, 2001; Götestam & Agras, 1995; Hudson et al., 2005; Preti et al., 2009; Wade et al., 2006).

A second differentiating factor is the gender of the participants included in samples. While studies with female participants are most common, it is possible to find studies with both

genders, though they rarely estimate sex-adjusted incidence/prevalence rates. These rates are sensitive to this criterion, as AN is overrepresented in female population. Lifetime prevalence rates in female population-based surveys often achieve higher values, between 1% (Hudson et al., 2997; Preti et al., 2009) and 2.0% (Favaro et al., 2003; Wade et al., 2009), compared to studies with both sexes (0.5.%; Faravelli et al., 2006; Preti et al., 2009) and, particularly, with the rates estimated for males (0.3%; Hudson et al., 2007).

The third factor to be considered is the age of the selected sample. Despite the variability in the participants' age range of reviewed studies in Table 5 (see Appendix), a large number of community studies excluded individuals younger than 18-years-old. This is of concern, as these adolescents are the subset of the population most at risk to develop AN. Hence, the reported prevalence rates might be considered lower-bound estimates of existent frequencies (Preti et al., 2009).

Data on the incidence trends of AN as measured in community samples are narrow and limited to short periods of time (less than two years). As observed in prevalence reports, the rates calculated on incidence are significantly higher than the majority of values cited in studies using case registers: 120/ 100 000 (Ghaderi & Scott, 2001) to 200/ 100 000 per year (Lahortiga-Ramos et al., 2005). The latter, higher rate may be due to: 1) the sample used (e.g., population-based; only females between 13 and 22 years of age); 2) time between baseline and follow-up (18 months); and/or 3) high response rates.

The relatively high incidence of AN found in these studies is consistent with other research pointing to an increase in the prevalence across time, particularly in the second half of the 20th century (Bulik et al., 2006; Preti et al., 2009). Nevertheless, the observed changes in cultural responses to AN over the last decades may have played a role in this increase. In addition to the easier access to specialized health services, the larger social awareness to confront this disorder and a decrease of the associated stigma, both should also be considered (Pawluck & Gorey, 1998). In fact, current cases of initial-diagnosis of AN tend to occur in mid-adolescence (Lahortiga-Ramos et al., 2005). Despite this, data may reflect a precocious appearance of the disease, and may also be due to an earlier detection of this pathology provided for an increased attention by the media.

As previously stated, community studies are useful to better understand the symptoms, the course, and the outcomes of AN. Analyzing the symptoms, there is a broad consensus about the over-representation of the full-blown and sub-threshold ED featured in the community. Lifetime prevalence rates of partial AN[4] in female samples were, on average, around 2.5% (Favaro et al., 2003; Wade et al. 2006).

Regarding the course and outcome, it seems that patients tend to migrate between different diagnostic categories of ED, despite that a great percentage of them (roughly 50%) experience substantial symptom recovery over the course of the disorder (Faravelli et al., 2006; Wade et al. 2006). It is likely that the outcome is not solely due to treatment, given that the use of health services among those affected remains low (Faravelli et al., 2006; Hudson et al., 2007; Preti et al., 2009).

[4] Subjects who share many of the features of patients with anorexia nervosa, but fail to meet strict diagnosis criteria.

4. Conclusion

The question of whether the incidence of AN is on the rise has been considerably debated and, using Pike's (2004, p.259) words, finding an answer to this question remains "a Herculian task". As a result of various sampling and assessment procedures, data from epidemiological studies have yielded conflicting findings and interpretations (Currin et al., 2005; Fombonne, 1995; Hoek, 2006; Hoek & van Hoeken, 2003; Hudson et al., 2007). The great disparity of estimates is a result of both complex disease and complex domains of study. Consequently, even the most robust future studies will likely be unable to eliminate all the methodological biases stated throughout this chapter (Pike, 2004).

The majority of metaanalytic studies reported an average prevalence rate for females with AN at 0.3% (Hoek, 1993, 2006; Hoek & van Hoeken, 2003; Hsu, 1996). The registered incidence rates peaked at 8/ 100 000 (0.008%) per year (Hoek, 2006). However, the recent population-based studies evidence an underestimation of true incidence rates. Researchers have reported substantial lifetime prevalence rates in females - near 2.0% - (Favaro et al., 2003; Wade et al., 2009), suggesting that, at the present, AN is a relatively common disease among adolescent girls and young women.

If this is true, when did AN start rising, and does this constitute an epidemic? The answers to these questions are approached using long-term studies (Lucas et al., 1999; Milos et al., 2004) and meta-analyses (Hoek, 2006; Hoek & van Hoeken, 2003; Hsu, 1996). These authors observed that the incidence of AN increased significantly during the 1960s and 1970s in females 12- to 25-years-old, despite not registering at epidemic proportions. Since that period the rates have remained fairly constant, suggesting that the incidence of AN has plateaued.

The period ruled by the increase of new cases may be characterized by the impact of environmental risk factors, which led to the increased rates until saturation. As Milos et al. (2004, p.255) argued: "If we assume that people need to have a vulnerability for developing AN, and there is a limited number of people with such vulnerabilities, we can expect that the effects of media-promoted beauty ideals will reach a peak in the sense of saturation effect and then a plateau".

Therefore, it makes sense that this increase has been registered in younger people, because these individuals are more vulnerable to socio-cultural influences during adolescence.

It should be noted that this interesting conclusion is only valid for severe cases, given that it derives from the analysis of treatment-seeking samples. The evolution of the number of cases with less severity, or those who are not in treatment, is unknown.

However, in our opinion, some signals of a slight increase in less severe cases among young females are given by recent data from robust community studies. Some researchers have suggested an increased prevalence of AN during the second half of the 20th century (Bulik et al., 2006; Hoek & Van Hoeken, 2003; Preti et al., 2009). However, this increase has not been reflected in an increase in the number of cases of AN in hospital records (Milos et al., 2004). This may mean that while the majority of cases are not seeking treatment and are likely the less severe cases of AN. Besides this fact, population-based surveys have revealed significant lifetime prevalence rates of partial AN, around 2.5%, and a point prevalence of 0.7% (Favaro et al., 2003; Wade et al., 2006), which may translate to an increase of cases with less pronounced symptoms. The fervent concern with body image and the desire to be thinner that has been reported in normal-weight female students (e.g. Afifi-Soweid et al.,

2002; Carmo et al., 1996; Neighbors & Sobal, 2007) may, in addition, contribute to the development of less severe forms of AN and sub-threshold ED.

It should be noted that the possible increase of partial syndromes should not be undervalued. Subclinical ED is equally alarming, particularly in adolescence, presenting a milieu of physical and mental problems during early adulthood (Johnson et al., 2002).

Future studies focusing on long-term, single, and large population-based epidemiological procedures to sample multiple regions and using standardized assessment methods, will surely help to clarify if partial syndromes and less severe cases of AN are in increasing trend. A good example of this type of survey was recently implemented in Europe, with the involvement of six countries (cf. Preti et al., 2009). The data obtained with the use of this methodology can provide more information about the evolution and distribution of different categories of ED within communities. It is important, however, to consider the presence of different profiles (e.g., purging in the absence of binge eating) and question the validity of the existing assessment tools (Wade, 2007).

Another challenge for new epidemiological research is the identification of etiological and risk factors in the development of AN. In this field, the study of groups with less common presentations of the disease might be particularly fruitful (Wakeling, 1996). Actually, some advances in the study of males, as well as Blacks and Asians, have been done in the last decade. For males, the recent incidence rate were estimated to be below 1.0/ 100 000 cases per year (Lucas et al., 1999; Currin et al., 2005) and the lifetime prevalence was at 0.3% (Hudson et al., 2007). Nevertheless, the studies with these populations are quite scarce. The same dearth in data is seen with transcultural studies, which are few and report contradictory data. Some such studies have verified an increase of AN in non-Western cultures (e.g. Nadaoka et al., 1996; Nakamura et al., 2000) but others have not (e.g. Hoek et al., 2005). This subset of inquiry has great potential for progress.

Despite great advancements in the study of the epidemiology of AN, there is still a long way to go to reach its full potential. Trends in AN could generate much useful information about the range of the disease, the adjustment of current classification, and its etiology. Cumulatively, the emerging outcomes may be useful in planning health services.

5. Summary

A substantial controversy exists as to whether or not AN is increasing. The strength of comparative studies are weakened by differences in the study-related methodologies. Aware of this limitation, we broached the question in the title of this chapter: is the increase in AN a myth or reality? Firstly, is important to clarify if there is indeed an increase in AN. The most recent studies suggest that the incidence of severe cases had increased over the past century, peaking in the 1970s, with a plateau from then to present day. Females 12- to 25-years-old were the largest contributing contingent in the growing expression of this disease. Considering that partial syndromes of AN have been achieving significant prevalence rates in recent studies, along with prevailing body dissatisfaction amongst the general population, it is possible that less severe forms of AN have been increasing during the 21st century. Determining if AN is an epidemic, is surely the less ambiguous part of the question to answer. General population-based epidemiological surveys have reported higher prevalence rates when compared to studies using other samples, but even that, does not constitute an epidemic. Nevertheless, it is possible to conclude that AN is relatively common among young females.

Reference	City/ Country	Source of case detection	Diagnostic criteria	Study period	Sample used to calculate the incidence	Incidence (per 100 000 population)	Total number of cases
Theander (1970)	South of Sweden	Medical records	Clinical	1931-1940 1941-1950 1951-1960	All (♀)	0.08 0.19 0.45 Per year=0.24	N(♀)=94
Kendell et al. (1973)	(a) Monroe (USA) (b) Camberwell (England) (c) Northeast of Scotland	Psychiatric case register	Clinical	Areas: (a) 1960-1969 (b) 1965-1971 (c) 1966-1969	All(♀) ♀ (15-34 years)	(a) USA- 0.37 (b) England- 0.66 (c) Scotland- 1.60 (a) USA- 0.8 (b) England- 4.1 (c) Scotland- 10.8	N(♀)=28
Jones et al. (1980)	Monroe (USA)	Psychiatric case register and medical records	Clinical	1960-1969 1970-1976	All (♀+♂) All (♀) ♀ (15-24 years) All (♀+♂) All (♀) ♀(15-24 years)	0.35 0.49 0.55 0.64 1.16 3.26	N(♀)=16 N(♀)=29
Willi & Grossmanan (1983)	Zurich (Switzerland)	Medical: pediatric and psychiatric records (public and private health services)	Clinical	1956-1958 1963-1965 1973-1975	All (♀)	0.38 0.55 1.12	N(♀)=10 N(♀)=17 N(♀)=38
Szmukler et al. (1986)	Northeastern Scotland	Psychiatric case register	Russell	1978-1982	All (♀+♂)	4.06	N(♀)=120 (estimated)
Eagles et al. (1995)	Northeastern Scotland	Hospital and primary care records	Clinical	1965-1991	All (♀)	Average annual increase: 5.3%	N(♀)= 287
Lucas et al. (1988)	Rochester, Minnesota (USA)	Medical records of possible eating disorder	DSM-III-R/ Russell	1935-1949 1950-1964 1965-1979	All (♀) 10-19 years (♀) 10-19 years (♀) Age- and gender-adjusted	52.4 21.6 48.6 7.3	1935-1979: N(♀)=128 N(♂)= 12

♀ - Females; ♂ - Males

***** Values calculated considering all diagnoses of eating disorders

Table 1. Studies in the clinical setting which estimate an increase in the incidence of anorexia nervosa

Reference	City/ Country	Source of case detection	Diagnostic criteria	Study period	Sample used to calculate the incidence	Incidence (per 100 000 population)	Total number of cases
Lucas et al. (1991)	Rochester, Minnesota (USA)	Medical records of possible eating disorder	DSM-III-R/ Russell		Age- and gender-adjusted		1935-1984: N(♀)= 166
				1935-1984		14.6	N(♂)= 15
				1950-1954		7.0	
				1980-1984		26.3	
					Age- and gender-adjusted	8.2	
Lucas et al. (1999)	Rochester, Minnesota (USA)	Medical records of possible eating disorder	DSM-III-R/ Russell	1935-1989	Age- and gender-adjusted	15.0	N(♀)= 193 N(♂)= 15
					Age- and gender-adjusted	8.3	
Møller-Madsen & Nystrup (1992)	Denmark (nationwide)	Nationwide psychiatric case register	ICD-8	1970-1989	All (♀+♂)*		Total
					1970	0.42	N(♀)= 844
					1988	1.36	N(♂)= 71
					1989	1.17	
					♀ (15-24 years)*		15-24 years:
					1970	3.37	N(♀)= 536
					1987	11.96	N(♂)= 30
					1989	8.97	
Joergensen (1992)	Fyn County (Denmark)	National register of psychiatric admissions, local hospital records, and registers of psychiatric outpatients	DSM-III-R	1977-1986	All (♀)	3.25	N(♀)= 87 N(♂)= 6
					♀ (10-24 years)	11.0	
Pagsberg & Wang (1994)	Bornholm County (Denmark)	National register of psychiatric admissions, local hospital records, and personal contact with physicians from the health care system	ICD-10	1970- 1989	All (♀)		N(♀)= 29 N(♂)= 1
					1970-1984	2.8	
					1985-1989	13.7	
					♀ (10-24 years)		
					1970-1984	11.9	
					1985-1989	57.1	
Milos et al. (2004)	Zurich (Switzerland)	Medical records	DSM-III-R	1963-1965	Total (♀+♂)	0.55	N(♀+♂) = 17
					♀ (12-25 years)	6.79	
				1973-1975	Total (♀+♂)	1.12	N(♀+♂) = 38
					♀ (12-25 years)	16.75	

♀ - Females; ♂ - Males

***** Values calculated considering all diagnoses of eating disorders

Table 1. (cont.) Studies in the clinical setting which estimate an increase in the incidence of anorexia nervosa

Reference	City/ Country	Source of case detection	Diagnostic criteria	Study period	Sample used to calculate the incidence	Incidence (per 100 000 population)	Total number of cases
Williams & King (1987)	London (England)	Psychiatric admissions register	Unspecified	1972-1981	All (♀) ♀ (10-64 years)	Between 1.4 and 2.0 Average annual increase: 2%	Unspecified
Nielsen (1990)	Denmark (nationwide)	Nationwide psychiatric admissions register	ICD-8	1973-1987	All (♀) All (♂)	1.90 0.17	N(♀)= 744 N(♂)= 63
Willi et al. (1990)	Zurich (Switzerland)	Medical and psychiatric records (public and private health services)	Clinical	 1956-1958 1963-1965 1973-1975 1983-1985	♀ (12-25 years)	 0.38 0.55 1.12 1.43	 N(♀)= 10 N(♀)= 17 N(♀)= 38 N(♀)= 48
Hall & Hay (1991)	Wellington (New Zealand)	Interview in the first admission of patients with eating disorders	DSM-III	1977-1986	All (♀+♂) ♀ (15-29 years)	5.0 33.9	N(♀)= 162 N(♂)= 8
Hoek et al. (1995)	Netherlands (nationwide)	General medical practitioners were trained to diagnose eating disorders	DSM-III-R and DSM-IV	1985-1989	All (♀+♂) All (♀) ♀ (15-19 years)	8.1 14.7 79.6	N(♀)=55 N(♂)= 5
Turnbull et al. (1996)	England	Primary care registers	Clinical	1988 1994	♀ (10-39 years) ♀ (10-39 years) Age- and gender-adjusted	18.5 18.1 4.2	Unspecified N(♀)=100
Currin et al. (2005)	England	Primary care registers	Clinical	2000	♀ (10-39 years) Age- and gender-adjusted	20.1 4.7	N(♀)=51
Milos et al. (2004)	Zurich (Switzerland)	Medical records	DSM-III-R	1983-1985 1993-1995	Total (♀+♂) ♀ (12-25 years) Total (♀+♂) ♀ (12-25 years)	1.43 16.44 1.17 19.72	N(♀+♂) = 48 N(♀+♂) = 41

♀ - Females; ♂ - Males

Table 2. Studies in the clinical setting which **do not** estimate an increase in the incidence of anorexia nervosa

Reference	City/ Country	Source of case detection	Diagnostic criteria	Study period	Sample size	Sample used to calculate the prevalence	Prevalence	Total number of cases
Duddle (1973)	Manchester (England)	Psychiatric evaluation of students admitted to the University Student Health Center	Clinical (Dally, 1969)	1966-1972	638 (♀ + ♂)	Undergraduate students	Not estimate 1966/67- 0 cases 1968- 1 case 1969- 2 cases 1970- 7 cases 1971- 13 cases	Duddle (1973)
Meadows et al. (1986)	Leicester (England)	Records from to General Hospitals Two-stage study (EAT + interview)	Eating Attitudes Test (EAT) and DSM-III	Unspecified	584 (♀)	♀ (18-22 years)	Not estimate 1 case	Meadows et al. (1986)
Kutcher, Whitehouse & Freeman (1985)	Scotland	Psychiatric case register	DSM-III	Unspecified	146 (♀ + ♂)	Psychiatric patients (♀+♂)	*Point prevalence:* 3.6%	N(♀)=5
Culberg & Engström-Lindberg (1988)	Nacka (Sweden)	Request information from multiple care givers (medical and non-medical)	DSM-III	1984-1985	4651 (♀ + ♂)	All (♀+♂) ♀ (16-24 years) ♂ (16-24 years)	*Period prevalence* (2 years): 22/ 100 000 258/ 100 000 21/ 100 000	N(♀)=16 N(♂)= 1
Lucas et al. (1988)	Rochester, Minnesota (USA)	Medical records review for comorbid diagnoses	DSM-III-R/ Russell	1935-1979	30 628 (♀ + ♂)	Age- and gender-adjusted (♀) age-adjusted (♂) age-adjusted	*Lifetime prevalence*: 113.1/ 100 000 203.9/ 100 000 16.9/ 100 000	1935-1979: N(♀)=128 N(♂)= 12
Lucas et al. (1991)	Rochester, Minnesota (USA)	Medical records review for comorbid diagnoses	DSM-III-R/ Russell	1985	32 353 (♀ + ♂)	Age- and gender-adjusted age-adjusted (♀) ♀ (15-19 years) age-adjusted (♂)	*Lifetime prevalence*: 149.5/ 100 000 269.9/ 100 000 480.3/ 100 000 22.5/ 100 000	1985: N(♀)= 99 N(♂)= 6

♀ - Females; ♂ - Males

Table 3. Prevalence studies of anorexia nervosa in the clinical setting

Reference	City/ Country	Source of case detection	Diagnostic criteria	Study period	Sample size	Sample used to calculate the prevalence	Prevalence	Total number of cases
Hoek (1991)	Netherlands (nationwide)	General practitioners were trained to diagnose eating disorders	DSM-III-R	1985	151 781 (♀ + ♂)	All (♀ e ♂)	*Point prevalence* 18.4/ 100 000	N(♀ e ♂)=28
Nielsen (1990)	Denmark (nationwide)	Nationwide register of psychiatric admissions	ICD-8	1973-1987	300 000 (♀ + ♂)	All (♀) ♀ (15-19 years) All (♂)	*Average prevalence per year:* 6.7/ 100 000 34.7/ 100 000 0.6/ 100 000	N(♀)= 744 N(♂)= 63
Joergensen (1992)	Fyn County (Denmark)	National register of psychiatric admissions, local hospital records, and registers of psychiatric outpatients	DSM-III-R	1977-1986	540 000 (♀ + ♂)	♀ (15-19 years)	*Over the total period*: 120/ 100 000	N(♀)= 87 N(♂)= 6

♀ - Females; ♂ - Males

Table 3. (cont.) Prevalence studies of anorexia nervosa in the clinical setting

Reference	City/ Country	Case detection method	Diagnostic criteria	Study period	Sample size	Sample used to calculate the prevalence	Prevalence	Total number of cases
Crisp et al. (1976)	England	Key informant (teachers and school medical officers) in both public and private institutions	Clinical	1972-1974	12 391 (♀)	Schoolgirls	*Over the total period*: Private schools- 1% Public schools- 0.2% All schools -4.6/1000	N(♀)= 57
Button & Whitehouse (1981)	England	Two-stage (EAT + interview)	Clinical	Unspecified	578 (♀ + ♂) College students	♀ + ♂ (16 years and older)	1/578	N(♀)= 1 N(♂)= 0
Mann et al. (1983)	London (England)	Two-stage (EAT + interview)	Clinical	1982	262 (♀) (2 schools)	♀ (15 years)	0%	N(♀)= 0
Johnson-Sabine et al. (1988)	London (England)	Two-stage (EAT + interview)	Clinical	Unspecified	1010 (♀)	♀ (14-16 years)	0%	N(♀)= 0
Råstam et al. (1989)	Gottembourg (Sweden)	Three-stage (questionnaires and growth charts + interview + case register)	DSM-III and DSM-III-R	1985	4291 (♀ + ♂)	♀ e ♂ (15 years)	*Period prevalence:* ♀ - 0.7% ♂- 0.09%	N(♀)= 14 N(♂)= 3
Patton et al. (1990)	London (England)	Two-stage (EAT + interview); 12 months of follow-up	Russell	Unspecified	176 (♀)	♀ (14-17 years)	0%	N(♀)= 0
Whitaker et al. (1990)	New Jersey (USA)	Two-stage (ESI and EAT + interview)	DSM-III	1984	5596 (♀ + ♂)	♀ (14-17 years)	*Lifetime prevalence*: 0.2%	N(♀)= 12 N(♂)= 0
Rathner & Messner (1993)	Italy	Three-stage (EAT and ANIS + interview+ case register)	DSM-III-R	Unspecified	517 (♀)	♀ (11-20 years) ♀ (11-14 years) ♀ (15-20 years)	*Point prevalence:* 0.58% 0.0% 1.3%	N(♀)= 4
Wlodarczyk-Bisaga & Dolan (1996)	Poland	Two-stage (EAT + interview); 10 months of follow-up	DSM-III-R	Unspecified	747 (♀)	♀ (14-16 years)	0%	N(♀)= 0
Carmo et al., (1996)	Lisbon and Tagus Valley (Portugal)	Questionnaire developed to assess diagnosis criteria (29 secondary state schools)	DSM-III-R	Unspecified	2422 (♀)	♀ (10-21 years)	0.4%	N(♀)= 9
Santonastaso et al. (1996)	Italy	Three-stage (EAT and IMC + interview + case register and 1 year follow-up)	DSM-IV	Unspecified	359 (♀)	♀ (16 years)	0%	N(♀)= 0

♀ - Females; ♂ - Males

Table 4. Epidemiological studies of anorexia nervosa with student samples

Reference	City/ Country	Case detection method	Diagnostic criteria	Study period	Sample size	Sample used to calculate the prevalence	Prevalence	Total number of cases
Rojo et al. (2003)	Valencia (Spain)	Two-stage (EAT-40 + interview)	DSM-IV	1998-1999	544 (♀ + ♂)	♀ + ♂ (12-18 years) ♀ (12-18 years) ♂ (12-18 years)	Period prevalence: 0.22% 0.45% 0.0%	N(♀)= 1 N(♂)= 0
Machado et al. (2004)	Minho (Portugal) and Galicia (Spain)	EDI + Questionnaire from COST Action B6	DSM-IV	Unspecified	College Students (♀): Portugal- 486 Spain – 595	Both samples (♀) (17-44 years)	0%	N(♀)= 0
Dixe (2007)	Central area of Portugal	EDI + Questionnaire	DSM-IV	Unspecified	High school and undergraduate students: 1388 (♀ + ♂)	♀ + ♂ (14-25 years)	0%	N(♀)= 0 N(♂)= 0
Machado et al. (2007)	Portugal	Two-stage (EDE-Q + Interview EDE)	DSM-IV	Unspecified	2028 (♀) (Public school system)	♀ (12-23 years)	0.39%	N(♀)= 8
Peláez Fernandez et al. (2007)	Madrid (Spain)	Two-stage (EAT-40 and EDE-Q + Interview EDE)	DSM-IV	2001-2002 academic year	1545 (♀ + ♂) (Public and private schools)	♀ (12-21 years) ♂ (12-21 years)	0.33% 0.0%	N(♀)= 3 N(♂)= 0

♀- Females; ♂ - Males

Table 4. (cont.) Epidemiological studies of anorexia nervosa with student samples

Reference	City/ Country	Case detection method	Diagnostic criteria	Study period	Sample size	Sample used to calculate the rate	Prevalence/ Incidence	Total number of cases
Robins et al. (1984)	USA: (a) New Heaven (b) Baltimore (c) St Louis	Household survey ("*Diagnostic Interview Schedule*" applied by lay interviewers)	DSM-III	1981-1982	(♀ + ♂) (a) 3058 (b) 3481 (c) 3004	♀ + ♂ (18-65 years)	*Lifetime prevalence*: 0.03% 0.1% 0.1%	Unspecified
Götestam & Agras (1995)	Norway	Self-report questionnaire send by mail	DSM-III-R	1992	1849 (♀)	♀ (18-59 years) ♀ (18-29 years) ♀ (18-59 years) ♀ (18-29 years)	*Lifetime prevalence*: 0.43 0.88 *Point prevalence:* 0.27% 0.35%	N(♀)= 8 N(♀)= 5
Ghaderi & Scott (2001)	Sweden	Questionnaire (survey for eating disorders)	DSM-IV	1999 (2-year follow-up study)	1122 (♀)	♀ (20-32 years)	*1-year incidence:* 120/ 100 000	N(♀)= 1
Favaro et al. (2003)	Padova (Italy)	Clinical Interview for DSM-IV (SCID)	DSM-IV	Unspecified	934 (♀)	♀ (18-25 years)	*Lifetime prevalence*: 2.0%	N(♀)= 19
Lahortiga-R. et al. (2005)	Navarra (Spain)	Two-stage (EDI + Interview)	DSM-IV	18 months follow-up	2734 (♀)	♀ (13-22 years)	*Incidence per year:* 200/ 100 000	N(♀)= 8
Bulik et al. (2006)	Sweden	Telephone interview of twins; and analysis of two additional sources of information (hospital discharge registry and cause-of-death registry)	DSM-IV	4- year period ending in 2022	31 406 individual twins (♀ + ♂)	Twins born between January 1, 1935 and December 32, 1958	*Overall prevalence (3 sources):* *1.20% (♀)*	N(♀)= 253
Faravelli et al. (2006)	Sesto Fiorentino (Italy)	Three-phase / two-wave design (interview by general practitioner + re-interview by psychiatrist + re-interview with EDE)	DSM-IV	Unspecified	2355 (♀ + ♂)	♀ + ♂ (14 years and older)	*Lifetime prevalence*: 0.42%	N(♀ + ♂)= 9
Wade et al. (2006)	Australia	Telephone interview to twins (EDE)	DSM-IV	2001-2003	1002 individual twins (♀)	♀ (28-39 years)	*Lifetime prevalence*: 1.9%	N(♀)= 19
Hudson et al. (2007)	USA	Household survey (face-to-face interview: SCID)	DSM-IV	2001-2003	2980 (♀ + ♂)	♀ (18 years and older) ♂ (18 years and older)	*Lifetime prevalence*: 0.9% 0.3% *Period Prevalence (year):* 0%	Unspecified
Preti et al. (2009)	Belgium, France, Germany, Italy, Netherlands, and Spain	Household survey (Two-phase interview: general psychiatric interview + SCID)	DSM-IV	2001-2003	4139 (♀ + ♂)	♀+♂ (18 years and older) ♀ (18 years and older) ♂ (18 years and older)	*Lifetime prevalence*: 0.48% 0.93% 0.0%	N(♀)= 22 N(♂)= 0

♀ - Females; ♂ - Males

Table 5. Epidemiological studies of anorexia nervosa with community samples

7. References

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