



Factors associated with recovery from anorexia nervosa

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ABSTRACT

Previous studies of prognostic factors of anorexia nervosa (AN) course and recovery have followed clinical populations after treatment discharge. This retrospective study examined the association between prognostic factors—eating disorder features, personality traits, and psychiatric comorbidity—and likelihood of recovery in a large sample of women with AN participating in a multi-site genetic study. The study included 680 women with AN. Recovery was defined as the offset of AN symptoms if the participant experienced at least one year without any eating disorder symptoms of low weight, dieting, binge eating, and inappropriate compensatory behaviors. Participants completed a structured interview about eating disorders features, psychiatric comorbidity, and self-report measures of personality. Survival analysis was applied to model time to recovery from AN. Cox regression models were used to fit associations between predictors and the probability of recovery. In the final model, likelihood of recovery was significantly predicted by the following prognostic factors: vomiting, impulsivity, and trait anxiety. Self-induced vomiting and greater trait anxiety were negative prognostic factors and predicted lower likelihood of recovery. Greater impulsivity was a positive prognostic factor and predicted greater likelihood of recovery. There was a significant interaction between impulsivity and time; the association between impulsivity and likelihood of recovery decreased as duration of AN increased. The anxiolytic function of some AN behaviors may impede recovery for individuals with greater trait anxiety.

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1. Introduction

Anorexia nervosa (AN) is a devastating and costly disorder, which places a high emotional and financial burden on patients and

their families. One of the foremost challenges for patients and caregivers is managing an illness that can be lengthy, physically destructive, and psychologically exhausting. The disorder ranks among the ten leading causes of disability among young women (Mathers et al., 2000) and has one of the highest mortality rates of any psychiatric disorder (Harris and Barraclough, 1998; Millar et al., 2005; Sullivan, 1995). However, considerable heterogeneity exists in its long-term course and outcome. The most comprehensive reviews of outcome studies in AN to date report that, on average, only

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one-third of individuals (37%) recover within 4 years after disease onset; this figure rises to almost half (47%) by year 10 and to 73% after 10 years post onset (Berkman et al., 2007; Steinhausen, 2002). However, approximately 25% of individuals with AN have a chronic or continuously relapsing course and crude mortality from suicide or medical complications from starvation or compensatory behaviors associated with the illness is 9% (Berkman et al., 2007; Steinhausen, 2002).

Identifying prognostic factors associated with illness duration and recovery could have crucial benefits. First, it would help patients, family members, and treatment providers manage expectations for illness duration and plan treatment options. Second, it would potentially assist providers in identifying which patients are at highest risk for developing a lengthy course or chronic illness. Third, it would aid providers in tailoring treatment to target each patient's individual risk factors for a longer length of illness while also reinforcing the patient's unique protective factors for recovery. Increasing the intensity or specificity of early treatment for the most at-risk patients could, in turn, shorten illness length or prevent chronicity.

The aim of the present study was to examine prognostic factors that are independently associated with AN recovery. The majority of studies examining AN course and prognostic factors has used a prospective longitudinal follow-up design by following patients after treatment discharge from community clinics, specialized clinics, or inpatient care (Berkman et al., 2007). We used a retrospective design with a large sample of women with AN from the multi-site International Price Foundation Genetic Study of AN Trios. Participants were recruited from specialty clinic-based settings and through local and national media advertisements. Given that approximately one-third of the individuals with AN in the community are treated in mental health care settings (Hoek, 2006) and only half of individuals with AN are detected in primary care settings (Hudson et al., 2007), the inclusion of a community-based participants in addition to clinic-ascertained participants potentially increases the ability to observe the course of AN with greater variation in disease severity (Agras et al., 2009).

We examined the following prognostic factors: a) eating disorder features, including age of onset, vomiting, laxative abuse, fasting, and excessive exercise; b) the personality traits of novelty seeking, harm avoidance, reward dependence, persistence, impulsivity, trait anxiety, and perfectionism; and c) psychiatric comorbidity including major depressive disorder (MDD), obsessive-compulsive disorder (OCD), post-traumatic stress disorder (PTSD), alcohol abuse or dependence, substance abuse or dependence, and borderline and avoidant personality disorders.

1.1. Hypotheses

Based on the extant literature about AN duration and prognostic factors for recovery, we hypothesized that an earlier age of onset and higher novelty seeking would be positive prognostic factors (i.e., factors that predict a higher likelihood of recovery; Ratnasuriya et al., 1991; Strober et al., 1997; Klump et al., 2004). We also anticipated that the following variables would be negative prognostic factors, predicting a lower likelihood of recovery: a) eating disorder features including vomiting, laxative abuse, and excessive exercise (Deter et al., 2005; Fichter et al., 2006; Strober et al., 1997); b) personality traits including greater harm avoidance, greater perfectionism, greater impulsivity, greater trait anxiety (Klump et al., 2004; Bardone-Cone et al., 2007; Fichter et al., 2006; Strober et al., 1997); and c) psychiatric comorbidity with MDD, anxiety, PTSD, OCD, alcohol and substance abuse or dependence, and personality disorders (Fichter et al., 2006; Halvorsen et al., 2004; Wonderlich et al., 1994; Bulik et al., 2008; Papadopoulou et al., 2009).

2. Method

2.1. Participants

Data were collected as part of the International Price Foundation Genetic Study of AN Trios, designed to identify genetic susceptibility loci of risk for eating disorders. A complete description of recruitment and data collection has been published previously (Reba et al., 2005). In brief, participants were recruited from nine sites in North America and Europe, including Pittsburgh (W.K.), New York (K.H.), Los Angeles (M.S.), Toronto (A.K., B.W.), Munich (M.F.), Pisa (A.R.), Fargo (J.M.), Baltimore (H.B., S.C.), and Tulsa (C.J.), between 2000 and 2003. Potential participants were identified through clinic databases, referral from clinicians with knowledge of the study, and advertisement through a variety of local and national media. The study was approved by local institutional review boards at all sites. Written informed consent was obtained before participation.

Participants were required to meet the following criteria: a) DSM-IV (American Psychiatric Association, 2000) lifetime diagnosis of AN, excluding the amenorrhea criterion; b) low weight less than 5th percentile of body mass index (BMI) for age and gender on the Hebebrand et al. (Hebebrand et al., 1996) chart from the National Health and Nutrition Examination Survey epidemiological sample; c) AN onset before age 25; d) weight controlled through restricting and/or purging, including vomiting, abuse of laxatives, diuretics, enemas, suppositories, or ipecac; e) age between 13 and 65; and f) the diagnosis of AN must have been met at least 3 years before study entry. The last criterion ensured that participants were unlikely to develop binge eating in the future because binge eating typically develops within the first three years after AN onset (Bulik et al., 1997a; Tozzi et al., 2005). Because the primary aim of the study was to investigate genetic loci associated with AN, only Caucasian participants were included (participants could be included with one non-Caucasian grandparent). Further details on inclusion/exclusion criteria have been published previously (Reba et al., 2005).

The study included 736 participants in total. The analysis sample in the present study excludes men ($n = 12$) because there were too few for meaningful comparisons. Participants who were missing age at last symptom or other age information ($n = 8$) were excluded as were women with a history of bulimia nervosa that predated the onset of AN ($n = 33$) because cases of bulimia nervosa to AN crossover were thought to represent a distinct subgroup (Tozzi et al., 2005). The resulting analysis sample included 680 women with AN who met all criteria listed above.

2.2. Measures

2.2.1. Eating disorder diagnoses and features

The Structured Interview for Anorexia Nervosa and Bulimic Disorders (SIAB; Fichter et al., 1998) and an expanded version of Module H of the Structured Clinical Interview for DSM-IV Axis I Disorders (SCID; First et al., 1997b) were administered to assess lifetime diagnosis of eating disorders including AN and age of onset of AN.

Compensatory behaviors such as fasting, vomiting, laxative abuse, and excessive exercise were also assessed with the SIAB. Only the presence of these behaviors was recorded not duration; thus, we were not able to include the duration of these compensatory behaviors as prognostic factors. For fasting, participants were asked, "Have you refrained from eating anything for more than 24 hours in order to avoid weight gain?" Fasting was scored present if participants endorsed fasting rarely (up to one day per month) or more frequently and absent if participants endorsed never fasting. For vomiting, participants were asked, "Have you induced vomiting in order to avoid weight gain?" Vomiting was scored present if participants endorsed any vomiting and absent if

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