Neuroticism and Low Self-Esteem as Risk Factors for Incident Eating Disorders in a Prospective Cohort Study

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Accepted 25 May 2002

Abstract: Objective: To assess the role of neuroticism and low self-esteem as risk factors for eating disorders (ED). Method: A representative sample of girls 12–21 years old from Navarre, Spain. Girls free from any ED in 1997 were followed up for 18 months and reevaluated using DSM-IV criteria. Multivariable logistic models were used to examine associations between neuroticism (Eysenck Inventory) or low self-esteem (36-item scale) and incident ED. Results: Higher levels of neurotic personality increased the risk of ED (adjusted odds ratio [OR] for the highest quartile, 3.3; 95% CI; 1.6–4.8). High levels of self-esteem were protective (OR, 0.32; 95% CI, 0.16–0.66). Neuroticism was a more powerful predictor than low self-esteem. Discussion: Our results provide prospective evidence supporting the role of neuroticism and low self-esteem as major determinants of ED. © 2003 by Wiley Periodicals, Inc. Int J Eat Disord 33: 271–280, 2003.

Key words: follow-up; anorexia; bulimia; Eysenck; perfectionism

INTRODUCTION

Eating disorders (ED) are much more prevalent among females. The average age of onset of an ED ranges from 14 to 20 years of age (Striegel-Moore, 1997). However, given that dieting and shape/weight concerns are highly prevalent among adolescent girls, little definitive evidence is available about the main risk factors that predispose young women

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Contrast grant sponsor: supported in part by grants from Fundacion Echebano, the Department of Health (Navarre Regional Government Project 24/99), and from Banco Santander-Central-Hispano.

Published online in Wiley InterScience (www.interscience.wiley.com). DOI: 10.1002/eat.10147

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to develop a clinically significant ED. Some researchers even consider that epidemiological research on ED is still in its “formative” years (Leung, Geller, & Katzman, 1996).

Many psychological risk factors have been postulated as predisposing girls to develop ED. These include difficult adjustment to puberty, problems with interpersonal relationships, maladaptive defense style, moodiness, deficient self-regulation, stress coping style (Strober, 1991), affective lability, or external locus of control (Kendler et al., 1991). But two psychological traits have been more consistently hypothesized to predict a higher risk of onset for these disorders: low self-esteem (Button, Sonuga-Barke, Davies, & Thompson, 1996) and high levels of neuroticism or perfectionism (Button et al., 1996; Kendler et al., 1991; Patton, 1988).

Low self-esteem is one of the risk factors most frequently reported to be associated with an increased risk of developing EDs (Fairburn, Welch, Doll, Davies, & O’Connor, 1997; Fairburn, Doll, Welch, Hay, Davies, & O’Connor, 1998; Fairburn, Cooper, Doll, & Welch, 1999; Gual, Pérez-Gaspar, Martínez-González, Lahortiga, Irala-Estévez, & Cervera, 2002; Silverstone, 1992). Several epidemiological studies have empirically shown associations between low self-esteem levels and a higher risk of ED (Button et al., 1996; Canals et al., 1996, Gardner et al., 2000; Ghaderi & Scott, 2001; Lilenfeld, Kaye, Greeno, Merikangas, Plotnicov, Pollice, Rao, Strober, Bulik, & Nagy, 1998; Neumark-Sztainer & Hannan, 2000; Rastam, 1992; Wichstrom, 1995). However, few prospective studies have confirmed this association (Button et al., 1996; Ghaderi & Scott, 2001). Moreover, the outcome used in most of these studies was not based on clinically defined diagnostic criteria but rather on responses to questionnaires (Button et al., 1997, Button et al., 1996, Canals et al., 1996, Gardner et al., 2000, Ghaderi & Scott, 2001; Neumark-Sztainer & Hannan, 2000). Beyond the clinical context, we are only aware of two epidemiological studies (Gual et al., 2002; Walters & Kendler, 1995) that have reported an association between low self-esteem and eating disorders in a population sample using accepted diagnostic criteria and by a psychiatrist experienced in diagnosing this disorder. Nevertheless, those studies used a cross-sectional design, and, therefore, at least in part, the identified association may be due to differential recall of past events or reverse causality. The same argument could be applied even to well-designed case-control studies (Fairburn et al., 1997; 1998; 1999).

Perfectionism has been related to a higher risk of EDs (Diaz-Marsa, Carrasco, & Saiz, 2000; Geller et al., 2000; Gual et al., 2002; Lilenfeld, Stein, Strober, Plotnicov, Pollice, Rao, Merikangas, Nagy, & Kaye 2000; Pliner & Haddock, 1996; Srinivasagam, Kaye, Plotnicov, Greeno, Weltzin, & Rao, 1995; Walters & Kendler, 1995). But, according to Eysenck and Eysenck (1964, 1971), neuroticism differentiates from perfectionism, and it is more precisely defined as a higher vulnerability when coping with stress or with life events. It also means a higher propensity to emotional instability and hypersensitivity. It is usually considered as one of the two extremes in a bipolar range, with “stability or self-control” at one end and “neuroticism” at the other. Some cross-sectional studies support the association between the Eysenck construct of neuroticism and the risk of EDs (Canals et al., 1996; Gual et al., 2002). But prospective evidence is needed, because neuroticism is a candidate for being one of the major modifiable determinants of ED. Longitudinal studies with prospective follow-up, adequate control for confounding, and validated end-points are usually the best-suited design to find this evidence. We assessed the association between self-esteem or neuroticism and ED using incident cases of ED, confirmed with DSM-IV criteria by an experienced psychiatrist and occurring during a follow-up period in girls initially free from these disorders.
METHODS

Selection of the Cohort

The methods of this study have been described elsewhere (Pérez-Gaspar, Gual, de Irala-Estévez, Martinez-González, Lahortiga, & Cervera, 2000; Gual et al., 2002). A representative sample of the female adolescent population (12–21 years old) of a Spanish Region (Navarre) was invited to participate in the study. Among 3472 girls aged 12 to 21 years who were invited, 2862 completed the baseline questionnaire (participation, 82.4%). The main reason for not participating was school absenteeism.

Baseline Screening

A screening procedure was accomplished at baseline. In the first phase of the screening we used the 40-item version of the EAT. The second phase was the confirmation of diagnosis for every participant scoring > 30 in the EAT-40. In this second phase we used a semistructured interview performed by a psychiatrist experienced in ED who applied DSM-IV criteria to diagnose anorexia nervosa (AN), bulimia nervosa (BN), or “eating disorder not otherwise specified” (EDNOS). Only psychiatrist-confirmed diagnoses according to DSM-IV criteria were considered as prevalent cases. In this initial screening (Pérez-Gaspar et al., 2000), we found 119 prevalent cases of ED (AN, 9 cases; BN, 22 cases; EDNOS, 88 cases). Prevalent cases were excluded from subsequent follow-up analyses. Therefore, the cohort at risk of new ED developing during the follow-up was 2743 girls.

We used the “Autoconcepto Forma A (AFA)” scale to appraise self-esteem. This tool includes 36 items and has been previously validated in a large sample of Spanish adolescents (Musitu, Garcia, & Gutierrez, 1994). It is more comprehensive than Rosenberg’s scale (only 10 or 15 items) and includes four different domains for self-esteem: social, emotional, familial, and academic. These four areas are globally referred to as measuring “overall self-esteem.” Although Rosenberg’s scale has been more frequently used in similar previous studies, it has never been validated in the Spanish population. In the scale we have used (AFA), self-concept is understood as multidimensional, hierarchically ordered, and increasingly differentiated with age, based on the Shavelson, Hubner, and Stanton model (Byrne & Shavelson, 1996; Shavelson, Hubner, & Stanton 1976).

We used the Eysenck Personality Inventory (Eysenck & Eysenck, 1964; 1971) with 57 items to assess neuroticism, sincerity, and extraversion. The range of the Eysenck subscale for neuroticism is 0–24 points.

Among potential confounders we collected data about parental marital status and other socio-demographic factors. Mass-media exposures and lifestyle characteristics were also collected at baseline in self-administered questionnaires together with the screening EAT. As we reported elsewhere (Martinez-González, Alonso, Gual, Lahortiga, De Irala-Estévez, & Cervera, 2002), radio and magazines, but not television use, were associated with a higher risk of ED. Therefore, we combined the exposure to the two mass media for which we found an association in a single variable, into three categories: girls who were both in the lower stratum of radio use (≤1 hour/day) and in the lower stratum of girls’ magazine use (<once weekly) were labeled as “low exposure.” Girls who only had one of these exposures were classified as “moderate exposure,” and girls who were exposed to both were classified as having “high exposure.” The habit of solitary eating, which can be a risk factor for developing ED, and therefore may confound the association with self-esteem or neuroticism, was assessed with a simple question in
the baseline questionnaire. Body weight was measured using an electronic scale cali-
brated to the nearest 100 g. Height was measured with an electronic device calibrated to
the nearest cm. Body mass index (BMI) was calculated as weight in kilograms divided by
height in squared meters.

Follow-up and Case-Ascertainment

Once we excluded prevalent cases, the initial cohort, \( n = 2743 \) was contacted and
re-evaluated again after 18 months of follow-up using similar procedures as in the initial
screening. After excluding those who had failed to provide reliable EAT questionnaires
in 1997 \( n = 11 \), we successfully followed-up 2509 girls who again completed the EAT-40
during 18 months (follow-up proportion, 92%). There were 446 with scores higher than
21 in this second application of the EAT-40. These girls were invited to a psychiatrist
interview. Among them, 394 interviews (88% of those scoring \( \geq 21 \) in the EAT) were
conducted by experienced psychiatrists, and 78 incident cases of ED were identified
(psychiatrists were blinded to the neuroticism and self-esteem scales). Among the
remaining 12% \( n = 52 \) of girls scoring \( \geq 20 \) in the EAT-40 who declined to be inter-
viewed (or were not located), we used their answers to the EAT-40 and to the Eating
Disorders Inventory (EDI, Garner, Olmsted, & Polivy, 1983) to ascertain the outcome
(ED). These questionnaires were reviewed by an expert panel of experienced psychi-
atrists who applied DSM-IV criteria and identified 12 additional cases among them.
They were blinded to the psychological characteristics (Eysenck scale, AFA scale) of
participants when they assessed the outcome.

Statistical Analysis

We used a two-tailed \( t \)-test to compare the mean of the self-esteem and neuroticism
scales at baseline between those girls who thereafter had ED develop and those who did
not. Similar procedures (or one-way ANOVA) were used to compare the means across
strata of potential confounding variables. We created four roughly equally sized groups
(quartiles) for the two scales (overall self-esteem and Eysenck’s neuroticism) and com-
puted the cumulative incidence of ED for each quartile. We created tertiles for both scales
to combine them into a single variable. Multivariable logistic regression modeling was
used to identify risk factors controlling for potential confounding variables. The psychia-
trist-confirmed diagnosis of ED was used as the outcome. Odds ratios (and their 95%
confidence intervals) were used as estimates of the relative risk of ED incidence.

RESULTS

During the follow-up we identified 90 incident cases of EDs according to DSM-IV
criteria. In the univariate comparison, significantly lower self-esteem was found among
those girls who subsequently developed an ED (Table 1). Self-esteem was higher in girls of
younger ages, of higher socioeconomic status, in those whose parents were not divorced/
separated or widowed, in those not having a sibling or parent with ED, and in those who
usually did not eat meals alone. Regarding the mean score in the neuroticism scale, the
only significant differences were found for socioeconomic status. The cumulative inci-
dence of ED progressively decreased with higher levels of self-esteem, whereas the
opposite was true for the neuroticism scale (Table 2). A higher than three fold increase
in the cumulative incidence of ED was observed between extreme quartiles for both scales.
To show the joint association of self-esteem and neuroticism with the risk of ED, we assigned participants to each of nine possible categories grouped using the cross-classification of tertiles of overall self-esteem and tertiles of neuroticism. This classification is presented graphically in Figure 1. The incidence of ED according to DSM-IV criteria for each of the categories was estimated. The girls that scored highest in the neuroticism scale and lowest in the self-esteem had the highest incidence of ED (6.1%), whereas those who scored in the lowest tertile of neuroticism and in the highest of self-esteem had together with those in the intermediate tertile of neuroticism and in the highest of self-esteem the lowest incidences (1.6 and 1.4 percent, respectively).

The self-esteem score showed a very apparent monotonic inverse association with the incidence of ED in the univariate (crude) logistic regression analyses (Table 3). Participants whose self-esteem was highest (4th quartile) had an apparent 69% relative reduction in the risk of ED. The adjustment for age, sociodemographic variables, and a selection of behavioral characteristics considered as potential confounders had little impact on the estimates of the odds ratios (OR). The $p$ value for the linear trend test in the fully adjusted model was highly significant for self-esteem (Table 2).

In contrast, Eysenck’s neuroticism scale was monotonically associated with an increased risk of ED. As Table 3 shows, in the univariate logistic regression model, a
high score (4th quartile) in the neuroticism scale was associated with a four fold increase in the odds of developing an ED. The adjustment for the variables shown at the footnote in the table reduced the magnitude of the OR, but the strength of the association remained substantially high in the fully adjusted model. The scale of sincerity also showed a positive significant association with the risk of ED albeit of lower magnitude (data not shown).

In Table 4 we present the results of the logistic regression model when we simultaneously introduced neuroticism and overall self-esteem as independent variables, in addition to the previously considered potential confounders (see footnote at the Tables 3 and 4). Both neuroticism and overall self-esteem remained as independent factors significantly associated with the diagnosis of ED. Neuroticism was an independent predictor of a higher risk of ED, controlling for self-esteem and showed a statistically significant trend ($p = 0.02$). The statistical significance for the linear trend for self-esteem was only marginal ($p = 0.050$), but nevertheless, the odds ratio for the highest quartile remained statistically significant, with a point estimate of 0.46, implying a greater than 50% relative risk reduction. When we restricted the analysis to girls younger than 18 years ($n = 1972$) at the onset of the study, we found stronger significant associations for both scales, despite the reduction in the sample size.

<table>
<thead>
<tr>
<th>Quartile</th>
<th>Self-Esteem % New Cases</th>
<th>Neuroticism % New Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (lowest)</td>
<td>5.1</td>
<td>1.6</td>
</tr>
<tr>
<td>2</td>
<td>4.7</td>
<td>3.0</td>
</tr>
<tr>
<td>3</td>
<td>3.1</td>
<td>3.6</td>
</tr>
<tr>
<td>4 (highest)</td>
<td>1.6</td>
<td>6.2</td>
</tr>
</tbody>
</table>

Figure 1. Cumulative incidence (%) of psychiatrist-diagnosed eating disorders (DSM-IV criteria) during a 18-month follow-up according to the joint classification of participants into tertiles of the self-esteem and neuroticism scales at baseline.
When we excluded the 12 cases who had been diagnosed by questionnaire, the odds ratios comparing quartiles of self-esteem and neuroticism did not substantially change.

**DISCUSSION**

As far as we are aware, this study is the first to simultaneously assess these two personality traits (neuroticism and self-esteem) in a large sample of girls recruited from the general population, who were initially free of eating disorders and were followed-up to assess the incidence of new cases. Moreover, it is one of the few

Table 3. Association between self-esteem or neuroticism and the incidence of psychiatrist-diagnosed eating disorder (DSM-IV criteria). Univariate (crude) and multivariate logistic regression models. Odds ratios (OR) and 95% confidence intervals (CI)

<table>
<thead>
<tr>
<th></th>
<th>Crude OR (95% CI)</th>
<th>Adjusted OR(^a) (95% CI)</th>
<th>p (Linear Trend)(^a)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Self-esteem(^b)</strong> Quartiles</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q1 (lowest)</td>
<td>1 (ref.)</td>
<td>1 (ref.)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Q2</td>
<td>0.91 (0.54–1.53)</td>
<td>0.94 (0.65–1.61)</td>
<td></td>
</tr>
<tr>
<td>Q3</td>
<td>0.60 (0.33–1.07)</td>
<td>0.62 (0.34–1.13)</td>
<td></td>
</tr>
<tr>
<td>Q4 (highest)</td>
<td>0.31 (0.15–0.61)</td>
<td>0.32 (0.16–0.66)</td>
<td></td>
</tr>
</tbody>
</table>

| **Neuroticism** Quartiles |                   |                              |                        |
| Q1 (lowest)             | 1 (ref.)          | 1 (ref.)                     | <0.001                 |
| Q2                       | 1.52 (0.76–3.04)  | 1.73 (0.79–3.78)             |                        |
| Q3                       | 2.14 (1.08–4.24)  | 1.30 (1.08–4.90)             |                        |
| Q4 (highest)            | 3.99 (2.11–7.53)  | 3.30 (1.59–4.83)             |                        |

\(^a\)Adjusted for age, marital, and socioeconomic status of parents; exposure to mass-media; body mass index, and existence of any previous eating disorder in the family.

\(^b\)Self-esteem was appraised by means of the Self-Concept A Form (AFA) scale (36 items).

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Table 4. Association between self-esteem or neuroticism and the incidence of psychiatrist-diagnosed eating disorder (DSM-IV criteria). Multivariate logistic regression models. Odds ratios (OR) and 95% confidence intervals (CI) when both variables were also adjusted for each other (simultaneously included in the same model)

<table>
<thead>
<tr>
<th></th>
<th>All the Sample (12–21 Years at Baseline)</th>
<th>Analysis Only Restricted to Girls &lt;18 Years</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Self-esteem(^b)</strong> Quartiles</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q1 (lowest)</td>
<td>1.03 (0.60–1.78)</td>
<td>1.20 (0.68–2.13)</td>
</tr>
<tr>
<td>Q2</td>
<td>0.77 (0.41–1.45)</td>
<td>0.71 (0.36–1.42)</td>
</tr>
<tr>
<td>Q3</td>
<td>0.46 (0.21–0.98)</td>
<td>0.37 (0.15–0.88)</td>
</tr>
<tr>
<td>Q4 (highest)</td>
<td>3.99 (2.11–7.53)</td>
<td>3.30 (1.59–4.83)</td>
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\(^b\)Adjusted for age, marital, and socioeconomic status of parents; exposure to mass-media; body mass index, and existence of any previous eating disorder in the family; in addition self-esteem was adjusted for neuroticism, and neuroticism was adjusted for self-esteem.
prospective epidemiological studies in ED that have used psychiatrist-diagnosed cases (applying DSM-IV criteria) as the outcome and not simply self-reported dieting or values above a cutoff point in a questionnaire. Our study examined two hypothesized relationships between personality and EDs: (1) Is high self-esteem a protecting factor for EDs? (2) Does the neuroticism personality trait increase the risk and precede the ED?

We had previously found a strong, independent, and consistent association of both high neuroticism and low self-esteem with a higher prevalence of ED using cross-sectional data (Gual et al., 2002). Now, our prospective analysis confirms the potentially causal association for these two traits with a considerable more robust design. The strength of the associations (> three fold), the careful control and adjustment we have made for confounding factors, the adequate time sequence ensured by our design, the apparent dose-response gradient, and the consistency with previous findings (Button, 1990; Button et al., 1996; Canals, et al 1996; Diaz-Marsa et al, 2000; Fairburn et al., 1997; Fairburn et al, 1999; Gardner et al, 2000; Ghaderi & Scott, 2001; Geller et al, 2000; Gual et al 2002; Kendler et al, 1991; Lilenfeld et al, 1998; Lilenfeld et al, 2000; Mcgee & Williams, 2000; Neumark-Sztainer & Hannan, 2000; Pliner & Haddock, 1996; Rastam, 1992; Silverstone, 1992; Srinivasagam et al, 1995; Walters & Kendler, 1995; Wichstrom, 1995) are strong reasons to support a cause and effect relationship.

Several limitations of our study must be acknowledged. Most of the cases we have included in our definition are only partial syndromes (EDNOS). Although our sample can be considered large, we did not have enough statistical power to conduct separate analyses to assess the specific risk factors for AN, BN, and EDNOS. Future, larger, prospective studies should differentiate the risk factors for each entity. Although our follow-up proportion can be considered high in absolute terms (92%) and this attrition rate (8%) is not likely to cause important bias, the proportion of girls lost to follow-up is perhaps relatively high when it is referred to the short follow-up period (18 months). When we selected a representative sample, we decided to face the problem of higher losses to follow-up to have the advantage of increasing the external validity of our sample. In addition, a short follow-up period increases the likelihood that some of the identified “risk factors” may also be early consequences of an underlying, subclinical form of disease. Longer prospective studies are needed to confirm our findings.

However, our results support that girls with high levels of neuroticism (according to the Eysenck concept) are more likely to develop a clinically defined ED. Correcting this neurotic trait should be assessed as a means to prevent the future onset of ED in adolescents. Special surveillance on girls presenting this trait could also be helpful in the prevention and early detection of ED.

Low self-esteem levels were associated with a wide range of sociodemographic variables. These associations were in the expected direction (lower values in lower socio-economic levels, in children of divorced/separated parents, etc.). In spite of controlling for all these factors, lower levels of self-esteem were still sound predictors of a higher risk of developing ED. Our findings lead us to speculate that raising self-esteem (if this were always feasible) can be an effective means of preventing ED. Further research should test these two types of interventions (raising self-esteem and controlling or correcting neuroticism) to assess their potential impact in the prevention of ED. Some interesting work in this field has been recently published (O'Dea & Abraham, 2000).

In this prospective study, estimates of association are now considerably lower in magnitude than those we found on our previous cross-sectional analysis of this same cohort (Gual et al., 2002). This difference in magnitude led us to think that low self-esteem and high neuroticism may be both causes and consequences of the development
of an ED, thus creating a “vicious circle” (a positive feedback mechanism) that perpetuates the problem, increasing the magnitude of the estimates.

The need to develop preventive strategies for ED among young female adolescents underlines the importance of our findings and prepares the ground to conduct well-designed trials (ideally field trials with a large sample size and randomized allocation) of intervention strategies.

REFERENCES


