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This is the **accepted version** of the journal article:

Krug, Isabel; Penelo Werner, Eva; Fernández Aranda, Fernando; [et al.]. «Low social interactions in eating disorder patients in childhood and adulthood : a multi-centre European case control study». Journal of health psychology, Vol. 18 Núm. 1 (2013), p. 26-37. DOI 10.1177/1359105311435946

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**Krug I, Penelo E, Fernández-Aranda F, Anderluh M, Bellodi L, Cellini E, di Bernardo M, Granero R, Karwautz A, Nacmias B, Ricca V, Sorbi S, Tchanturia K, Wagner G, Collier D, Treasure J. (2013). Low social interactions in eating disorder patients in childhood and adulthood: a multi-centre European case Control study. *Journal of Health Psychology*, 18, 26-37. doi: 10.1177/1359105311435946**

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## Abstract

The objective of this article was to examine lifestyle behaviours in eating disorder (ED) patients and healthy controls. A total of 801 ED patients and 727 healthy controls from five European countries completed the questions related to lifestyle behaviours of the Cross-Cultural Questionnaire (CCQ). For children, the ED sample exhibited more solitary activities (rigorously doing homework [ $p<0.001$ ] and watching TV [ $p<0.05$ ] and less socializing with friends [ $p<0.05$ ]) than the healthy control group and this continued in adulthood. There were minimal differences across ED sub-diagnoses and various cross-cultural differences emerged. Reduced social activities may be an important risk and maintaining factor for ED symptomatology.

**Keywords:** anorexia nervosa, bulimia nervosa, cultural differences, eating disorders, EDNOS, lifestyle behaviours, low social interactions

## Introduction

Numerous interrelated risk factors have been implicated in the development of eating disorders (EDs) (Jacobi et al., 2011; Stice et al., 2011). One conceptual model postulates that EDs are a form of neurodevelopmental disorder in which problems with social functioning play a key role (Connan et al., 2003). The developmental phenotype at risk for an ED includes several markers of social difficulties including loneliness, shyness, inferiority and low social support (Fairburn et al., 1998; 1999). Approximately a fifth of cases are thought to have autistic spectrum traits such as reduced empathy (Gillberg et al., 1994) and obsessive-compulsive personality traits (Anderlueh et al., 2003), which may underpin some of these social difficulties. It is therefore an interesting question to examine whether these traits are manifested in the form of social developmental problems before the onset of an ED.

The present study was part of the Fifth European Framework project on Healthy Eating, which is a collaboration of eight countries with the task to examine the individual and environmental factors related to EDs. We employed a large sample size of ED patients and healthy controls from five of the eight involved European countries to assess whether there are differences in childhood and adulthood lifestyle behaviours across these two groups. Furthermore, we were interested to find out whether these behaviours varied across ED diagnoses and whether there were cultural differences in the ED group. Based on the neurodevelopmental hypothesis, we assumed that social difficulties would be higher in ED patients than the healthy controls and that these problems would be displayed before the onset of the disorder.

## Method

### *Participants*

The present study employed a case-control design. Six centres from five European countries (Spain, Austria, UK, Slovenia and two for Italy) participated in the current study: the University Hospital

of Bellvitge, Barcelona, Spain [242-ED; 152-HC (Healthy Controls)]; the Department of Child and Adolescent Psychiatry, Medical University of Vienna (94-ED; 59-HC); the Eating Disorders Research Unit, Institute of Psychiatry, London, UK (272-ED; 145-HC); the Department of Neurology and Psychiatric Services, University of Florence, Italy (48-ED; 50-HC); the Department of Psychiatry, Fondazione Centro del Monte Tabor, Milan, Italy (90-ED; 101-HC) and the University Psychiatric Hospital, University of Ljubljana, Slovenia (55-ED; 220-HC). Figure 1 shows the flow diagram of the participants for the study.

Entry into the study was between March 2001 and September 2002. The total sample comprised 1528 female participants, 801 ED patients ( $N=170$  with Anorexia Nervosa-restrictive [AN-R] subtype, 21.2%;  $N=146$  with AN-binge-purging [AN-BP] subtype, 18.2%;  $N=242$  with Bulimia Nervosa (BN) subtype, 30.2%;  $N=180$  with Eating Disorders Not Otherwise Specified (EDNOS), 22.5%; and  $N=63$  without an ED-sub-diagnosis available, 7.9%) and 727 healthy controls (Figure 1). The mean age of the whole sample was 25.0 years ( $SD = 8.3$ ).

Most of the ED participants were ascertained from clinical institutions and were ill at assessment. Some (< 20%) came from community sources, for example, user or carer organizations or from advertisements. Participants were diagnosed according to DSM-IV-R (APA, 2000) criteria, using a semi-structured clinical interview, the SCID-I (First et al., 1996) or the EATATE (Anderluh et al., 2009; only used in Austria and the UK) carried out by experienced psychologists and psychiatrists. As shown in Figure 1, for the present analysis, the following individuals had to be excluded from the initial sample of 945 ED patients: (a) participants with insufficient data to conduct meaningful comparisons ( $N=81$ ); (b) patients with missing values for any diagnostic tools ( $N=59$ ); and individuals with (c) cognitive impairment ( $N=2$ ) and (d) comorbid psychotic disorder ( $N=2$ ). Decisions were made by psychologists or psychiatrists who completed the anamnesis together with the treatment team according to published treatment guidelines (APA, 2000).

Healthy controls were ascertained from various community sources at each site and were asked to volunteer in a study of factors associated with the development of EDs. All healthy controls were from the same catchment areas as index patients. From the initial sample of 733 healthy controls, six participants were excluded, who indicated a lifetime ED screened by the SCID-I (First et al., 1996) according to DSM-IV-R criteria (APA, 2000) and the EAT-26 (total score > 20; Garner et al., 1982). Each site obtained ethical approval separately from its own institutional review board.

### Assessment

*The lifestyle behaviours section of the Cross-Cultural Risk Factor Questionnaire (CCQ).* An expert group from various European countries developed this retrospective self-administered questionnaire. It includes 51 items with six subscales. A recent study on the psychometric properties of the CCQ offers preliminary evidence that it is a useful and a valid screening instrument to assess past and present factors of risk and maintenance for EDs in a variety of different countries (Penelo et al., 2011). In the present study, the questions relating to lifestyle behaviours were considered. A more detailed description of the CCQ can be found in earlier publications (Fernandez-Aranda et al., 2007; Krug et al., 2008; 2009).<sup>1</sup>

In the section on lifestyle behaviours, participants were asked to indicate which of the following activities (doing homework, watching TV/videos, reading, active play with friends/siblings, playing sports, etc.) they performed when they were of school age (before they were 12 years old). For the activities that they did perform, they were also asked to estimate how many hours per day they spent on each activity on a typical day. Furthermore, participants were asked to indicate how many hours per day they currently spend on the same activities. The only items that were slightly adapted or modified in the adulthood questions were doing homework, which changed to currently working/studying. We also assessed using the computer during childhood versus the Internet in adulthood. However, since these variables comprised a lot of missing data (which could be related to the fact of the use of new technologies at the time of assessment [2001-2002], was not as widespread as they are today), they had to be excluded from the analysis.

*EATATE phenotype interview.* The EATATE interview was developed for the European Healthy Eating Project. It is a semi-structured interview, comprising a European adaptation of the longitudinal interval follow-up evaluation (LIFE; Keller et al., 1987) and the eating disorders examination (EDE; Cooper et al., 1989). The interview is used to obtain a lifetime history of ED symptoms, which are then plotted on a lifeline. The EATATE instrument has been used previously in AN research (Anderluh et al., 2009) and demonstrates good inter-rater reliability in terms of diagnoses (kappa 0.82–1.0) and illness history variables (0.80–0.99).

### *Procedure*

Participants were invited to participate in a collaborative, multi-centre study across Europe, investigating associated ED factors. All patients were first assessed by psychologists or psychiatrists using a two-hour structured diagnostic face-to-face or phone interview to measure ED symptoms and psychopathological traits. ED diagnoses were based on this interview and were consensually derived among members of the clinical team who had participated in the assessment. An information sheet at the start of the questionnaire informed the participants about the purpose of the study and assured confidentiality of the results. Furthermore, it was

emphasized that participation in the study was completely voluntary and that participants were free to withdraw from the study at any time.

### *Statistical analyses*

The statistical analysis was conducted using SPSS version 17.0 (SPSS, Chicago, IL, USA). All significance tests were two-tailed. T-tests for continuous and chi-square tests for discrete variables were used to assess whether ED patients and healthy controls differed on socio-demographics. For the remaining comparisons, ANOVA analyses, adjusted by sex, age and education level were carried out with Finner's correction for multiple comparisons and post-hoc analyses were corrected by Bonferroni. Binary logistic regression also adjusted by sex, age and education were conducted to evaluate the effect of childhood lifestyle behaviours (independent variables) on the presence of a later ED (dependent variable). The model's ability to discriminate between groups was assessed with the area under the receiver-operating curve (AUC). The model's calibration was examined using the Hosmer-Lemeshow test. Finally, Nagelkerke R<sup>2</sup> was used to estimate how much variance was accounted for in the model.

## **Results**

### *Socio-demographics*

Table 1 contains the socio-demographic characteristics for the total sample stratified by country. Age differed significantly between the two groups, with the ED patients being older than the healthy controls. This may account for the fact that more controls than ED patients were currently studying. Furthermore, compared to the healthy control group, ED patients were more frequently employed and they also had a higher education. The ED group comprised significantly more females than the healthy control group. Finally, the ED patients had grown up more frequently in urban places.

The closeness of the population matching varied between countries. In the Austrian and Slovenian sample the ED patients were significantly older than the healthy controls. In Spain and Slovenia significantly more females than males were assessed. In comparison to the other countries, in Slovenia, the ED patients were significantly less educated than the healthy controls. Compared to the controls, significantly more ED patients were employed in Spain and Slovenia. It should be noted that all these differences were clinically small but high power meant that they were statistically significant at the .05 level.

### *Lifestyle behaviours in ED patients, ED sub-diagnoses and healthy controls*

Table 2 presents lifestyle behaviours for ED patients and healthy controls (left) and for ED sub-diagnoses also compared to healthy controls (right) during childhood and adulthood. As regards to the childhood variables, ED patients spent significantly more time doing homework and watching TV than the healthy controls. On the other hand the controls played significantly more commonly with friends/siblings than the ED individuals. The adulthood variables revealed a similar pattern, with the ED group spending significantly more hours working/ studying, watching TV and reading than the healthy controls. Also, compared to the controls, the ED group was more frequently involved in sports. As regards to ED sub-diagnoses, there were only a few significant differences in adult behaviours with EDNOS patients presenting with more social behaviours and more sports than the other ED diagnoses.

### *Lifestyle behaviours in ED patients across countries*

In Table 3 the differences in lifestyle behaviours for ED patients across countries is shown. Austria was not included in these analyses

because of the low percentage of valid responses. As can be seen from the table, during childhood, highest TV use was in the UK and Spain. The UK also showed the highest values for reading. Children in Spain and Italy exhibited significantly higher levels of social behaviours (playing with friends/siblings) than the other countries. In adulthood, the UK displayed the highest values for solitary activities (watching TV and reading) and sport. The Slovenia sample generally presented with the lowest values for most of the childhood and adulthood variables, in that they engaged less frequently in solitary behaviours but also spent less time socializing and doing sports.

### *The effect of childhood lifestyle behaviours on a subsequent ED*

Binary logistic regression analysis, assessing the effect of childhood lifestyle behaviours on the presence of a later ED, indicated that doing excessively homework (OR = 1.96; 95% CI OR: [1.61; 2.37],  $p < 0.001$ ) and watching TV (OR = 1.15; 95% CI OR: [1.02; 1.31],  $p = 0.024$ ) were significantly and positively associated with a subsequent ED. Conversely, more time spent playing with friends and/or siblings was negatively related (OR = 0.83; 95% CI OR: [0.73; 0.94],  $p = 0.003$ ) and, thus, can be considered as protective. Adjustment of the model was correct ( $p = 0.723$  for Hosmer-Lemeshow test), but the total variance accounted for in the model was 15.8 percent. Furthermore, the model was able to properly discriminate among the two groups (AUC = 0.70).

## **Discussion**

To our knowledge, this is the first study assessing lifestyle behaviours in a large sample of ED patients and healthy controls across five European countries. The main findings of our study were that compared to the healthy controls in childhood, the ED patients reported fewer social and more sedentary behaviours, including doing rigorously homework and watching TV. Conversely, the healthy control group interacted more frequently with friends and/or siblings. Developmental continuities in these behaviours were observed although participation in sport increased in adulthood. There were few differences across ED sub-diagnoses, other than the EDNOS group participating in more socializing and sport activities. The risk for a subsequent ED was doing excessively homework but also watching TV. Engaging in social activities, such as playing with friends and/or siblings, on the other hand was negatively associated with a later ED diagnosis. Interestingly, in terms of cross-cultural differences during childhood, the Mediterranean countries (Spain and Italy) spent more time playing with friends and/or siblings than the other countries.

### *Do eating disorder patients have higher self-expectancies than controls?*

One of our main findings was that ED patients spent significantly more time doing homework during childhood and working/studying longer hours during adulthood. This might be a marker of the fact that ED patients are perfectionists, with excessive goal orientation and high standards. In fact all these attributes have commonly been reported in ED patients (Cain et al., 2008; Gunnard et al., 2011). In addition, the literature has shown a significant and robust association between childhood obsessive-compulsive personality traits and a subsequent ED diagnosis (Anderluh et al., 2003).

### *Do eating disorder patients spend less time with social behaviours than controls?*

Another main finding was that ED patients spent more time undertaking solitary behaviours such as watching TV, reading and less socializing with friends than healthy controls. In accordance with our results, previous studies (Kim et al., 2011; Kyriacou et al., 2009; Stice and Whitenton, 2002) have found that social and attachment difficulties may precede the onset of an ED and that, on the other hand, friendship groups may protect against the development of EDs (Schutz and Paxton, 2007; Tremblay and Lariviere, 2009)

These antecedent solitary behaviours may promote problems with eating and shape and weight (Dixon et

al., 2007; Granich et al., 2011). For example, watching TV may encourage the consumption of snacks. Content examinations of TV advertisements reveals that food, especially fast food, is the most commonly promoted product (Coon and Tucker, 2002), and that it is generally presented during children's TV programmes (Hebden et al., 2011). Accordingly, the risk of developing any kind of ED has been found to be associated with ingesting excessively sweets and snacks early in life (Fernandez-Aranda et al., 2007; Harvey et al., 2011; Krug et al., 2009).

Furthermore, internalization of the slim social ideal may result from exposure to this concept in the media (Becker et al., 2011; Calado et al., 2010), although watching sports on TV has been linked to enhanced body image and favourable eating behaviours (Tiggemann and Pickering, 1996)

### *Are there cultural differences in lifestyle choices in ED patients?*

In terms of cultural differences, our results indicate that during childhood, the Mediterranean countries, including Spain and Italy, spent more time playing with siblings and/or friends than the other countries. These findings are in agreement with previous studies (Munoz et al., 2009; Schroder et al., 2006; Seeman, 2000) that have shown that a Mediterranean lifestyle, characterized by socially rewarding experiences with family members and friends, is often linked to improved well-being and adaptive coping mechanisms. However, for the adulthood variables, such cultural differences could no longer be retrieved, possibly because new technologies might have replaced traditional socializing activities with online networking sites. Interestingly, a recent study (Preti et al., 2009) assessing the prevalence of EDs in six different European countries (based on a general population cross-sectional household survey) found the lowest prevalence rates for any ED in Spain (2.42%, 1.5–4.0) and the highest rates for Italy (3.35%, 2.2–5.0), but the large overlap suggests that there may not be differences in risk and maintaining factors. However, a comparison of the incidence and lifetime prevalence may be needed to examine this in more detail.

### *Implications*

These findings support the model that suggests that social developmental difficulties may precede the onset of an ED. It is difficult to disentangle whether these are primary problems or whether they are secondary to high levels of goal striving behaviours (eg, doing rigorously homework and/or working/studying). Prevention programmes should convey the need for balance in life between striving and competition and social support and co-operation.

### *Limitations*

The results of this study must be interpreted within the context of some methodological limitations. Firstly, the retrospective self-report data collection procedures may have limited the validity. Secondly, even though participants provided responses about two different time points (childhood and adulthood) of their personal history, both types of measures were not recruited prospectively, but at the same time point. Longitudinal data across numerous life stages would therefore be of particular interest. Furthermore, the lifestyle behaviour section of the CCQ was not able to disentangle whether our participants engaged in solitary or team sport. In the future it will therefore be important to have more detailed questions about sporting activities and the reasons for engaging in exercise.

### **Conclusions**

To conclude, the present study assessed the importance of a number of lifestyle behaviours in ED patients and healthy controls across different European countries. Both childhood and adulthood behaviours were assessed. Our main findings were that during childhood, a high commitment to school/work and more solitary pursuits were related to a subsequent ED diagnosis in various cultural settings. This has implications for primary and secondary ED prevention programmes.

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Table 1

Total European	United Kingdom		Spain		Austria		Slovenia		Italy			
ED** (N = 801) AN-R = 170 AN-BP = 146 BN = 242 EDNOS = 180	Controls (N = 727) AN-R = 66 AN-BP = 68 BN = 34 EDNOS = 104	ED** (N = 242) AN-R = 39 AN-BP = 34 BN = 102 EDNOS = 46	Controls (N = 152) (N = 94)AN-R = 22AN-BP = 8 BN = 32 EDNOS = 17	ED** (N = 55) AN-R = 2 AN-BP = 5 BN = 18 EDNOS = 7	Controls (N = 220)	ED** (N = 138) AN-R = 41 AN-BP = 31 BN = 56 EDNOS = 6	Controls (N = 151)					
Age, mean (SD)	26.5 (8.7)*	23.4 (7.6)*	28.5 (11.2)	27.5 (11.0)	24.7 (5.6)	25.1 (4.4)	26.6 (8.3)*	23.7 (6.3)*	25.3 (7.0)*	18.2 (4.5)*	26.4 (7.5)	25.1 (6.1)
Gender: female (%)	96.1*	89.1*	97.4	98.6	94.2*	84.8*	100.0	96.6	98.2*	82.6*	92.0	94.0
Area where brought up: Urban (%)	68.8*	56.2*	71.2	67.4	73.0	79.3	80.0	55.9	37.0	31.4	68.8	58.9
Highest education level: Secondary (%)	57.5*	50.6*	47.2*	32.2*	57.3*	12.6*	0	5.1	66.7*	95.9*	77.5*	57.6*
Employment status: yes (%)	55.8*	37.7*	54.3	58.9	63.1*	43.4*	64.7	61.0	52.9*	5.1*	43.4	55.0
Students: yes (%)	48.6*	76.8*	54.3	63.9	43.8*	77.7*	53.8*	98.3*	60.0*	94.1*	39.3*	55.0*

Table 2

Adjusted means (SE)	Comparison: ED patients vs controls			Patients with ED: Statistical comparisons with control group**				Patients with ED: Statistical comparisons among subED***
	Controls (N=727)	ED (N=801)	p*	AN-R (N=170)	AN-BP (N=146)	BN (N=242)	EDNOS (N=180)	
Childhood								
Doing homework	0.8 (0.03)	1.2 (0.03)	<.001	1.3 (0.08)	1.2 (0.08)	1.1 (0.06)	1.1 (0.07)	<.001
Watching TV/videos	1.4 (0.05)	1.6 (0.05)	.006	1.6 (0.12)	1.7 (0.12)	1.6 (0.09)	1.5 (0.10)	.017
Reading books/magazines	0.9 (0.05)	0.9 (0.05)	.335	0.7 (0.11)	1.0 (0.11)	0.8 (0.09)	1.0 (0.10)	.164
Playing with friends/siblings	2.0 (0.05)	1.8 (0.05)	.010	1.7 (0.12)	2.0 (0.13)	1.9 (0.10)	1.8 (0.11)	.100
Playing sport	1.0 (0.05)	1.0 (0.06)	.324	0.8 (0.12)	1.1 (0.12)	1.1 (0.10)	0.9 (0.10)	.326
Adulthood								
Working/Studying	1.8 (0.05)	2.0 (0.05)	<.001	2.0 (0.10)	2.1 (0.11)	2.0 (0.09)	2.0 (0.09)	.008
Watching TV/videos	1.2 (0.05)	1.4 (0.05)	.006	1.3 (0.11)	1.6 (0.12)	1.3 (0.10)	1.6 (0.10)	.007
Reading books/magazines	0.8 (0.05)	1.1 (0.05)	.006	0.9 (0.11)	1.2 (0.12)	1.0 (0.10)	1.2 (0.10)	<.001
Socialising outside home	1.9 (0.05)	1.9 (0.06)	.087	1.8 (0.13)	1.9 (0.14)	1.9 (0.11)	2.3 (0.11)	.030
Playing sport	0.7 (0.05)	1.1 (0.06)	<.001	0.7 (0.15)	1.2 (0.14)	1.1 (0.11)	1.2 (0.11)	<.001

(AN-R=AN-BP=BN)<EDNOS  
AN-R<EDNOS

Table 3

Adjusted means (SE)	UK (N = 272)	Spain (N = 242)	Slovenia (N = 55)	Italy (N = 138)	p*	Statistical comparisons among countries**
<b>Childhood</b>						
Doing homework	1.3 (0.05)	1.2 (0.06)	0.5 (0.11)	1.1 (0.12)	<.001	(UK=Sp=It)>Slov
Watching TV/videos	1.6 (0.08)	1.8 (0.08)	0.9 (0.17)	1.2 (0.17)	<.001	Sp>It; UK and Sp>Slov
Reading books/magazines	1.0 (0.07)	0.7 (0.08)	0.9 (0.15)	0.9 (0.16)	.031	UK>Sp
Playing with friends/siblings	1.7 (0.08)	2.0 (0.09)	1.5 (0.19)	2.3 (0.19)	.002	UK<Sp and It; It>Slov
Playing sport	1.0 (0.07)	1.0 (0.08)	0.8 (0.18)	0.9 (0.18)	.863	
<b>Adulthood</b>						
Working/Studying	2.0 (0.07)	2.1 (0.08)	1.7 (0.15)	2.0 (0.16)	.055	
Watching TV/videos	1.7 (0.09)	1.4 (0.09)	0.9 (0.19)	0.9 (0.19)	<.001	UK>(Sp=Slov=It)
Reading books/magazines	1.2 (0.08)	1.0 (0.09)	0.6 (0.18)	1.1 (0.20)	.019	UK>Slov
Socialising outside home	2.1 (0.09)	1.8 (0.10)	0.9 (0.19)	2.3 (0.20)	<.001	(UK=Sp=It)>Slov
Playing sport	1.3 (0.09)	0.8 (0.11)	0.6 (0.18)	1.1 (0.22)	.002	UK>Sp and Slov

Figure 1

