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## Original article

## Physical activity in anorexia nervosa: How relevant is it to therapy response?



S. Sauchelli<sup>a,b</sup>, J. Arcelus<sup>c</sup>, I. Sánchez<sup>a</sup>, N. Riesco<sup>a</sup>, S. Jiménez-Murcia<sup>a,b,d</sup>, R. Granero<sup>b,e</sup>, K. Gunnard<sup>f</sup>, R. Baños<sup>b,g</sup>, C. Botella<sup>b,h</sup>, R. de la Torre<sup>b,i,j</sup>, J.C. Fernández-García<sup>b,k</sup>, J.M. Fernández-Real<sup>b,l</sup>, G. Frühbeck<sup>b,m</sup>, J. Gómez-Ambrosi<sup>b,m</sup>, F.J. Tinahones<sup>b,k</sup>, F.F. Casanueva<sup>b,n</sup>, J.M. Menchón<sup>a,b</sup>, F. Fernandez-Aranda<sup>a,b,d,\*</sup>

<sup>a</sup> Department of Psychiatry, University Hospital of Bellvitge-IDIBELL, 08907 Barcelona, Spain

<sup>b</sup> CIBER Fisiopatología Obesidad y Nutrición (CIBEROBN), Instituto Salud Carlos III, Madrid, Spain

<sup>c</sup> Eating Disorders Service, Glenfield University Hospital, Leicester NG1 5BH, United Kingdom

<sup>d</sup> Department of Clinical Sciences, School of Medicine, University of Barcelona, 08036 Barcelona, Spain

<sup>e</sup> Departament de Psicobiologia i Metodologia, Universitat Autònoma de Barcelona, 08193 Barcelona, Spain

<sup>f</sup> Department of Psychiatry, Psychology and Psychosomatic Medicine, Hospital Universitario Quirón Dexeus, 08028 Barcelona, Spain

<sup>g</sup> Department of Psychological, Personality, Evaluation and Treatment of the University of Valencia, 46101 Valencia, Spain

<sup>h</sup> Department of Basic Psychology, Clinic and Psychobiology of the University Jaume I, 12071 Castelló, Spain

<sup>i</sup> Human Pharmacology and Clinical Neurosciences Research Group, Neuroscience Research Program, IMIM (Hospital del Mar Medical Research Institute), 08003 Barcelona, Spain

<sup>j</sup> Department of Experimental and Health Sciences, Universitat Pompeu Fabra, 08002 Barcelona, Spain

<sup>k</sup> Department of Diabetes, Endocrinology and Nutrition, Hospital Clínico Universitario Virgen de Victoria, 29010 Málaga, Spain

<sup>l</sup> Department of Diabetes, Endocrinology and Nutrition, Institut d'Investigació Biomèdica de Girona (IdIBGi), Hospital Dr Josep Trueta, 17007 Girona, Spain

<sup>m</sup> Department of Endocrinology and Nutrition, Clínica Universidad de Navarra, University of Navarra, 31008 Pamplona, Spain

<sup>n</sup> Department of Medicine, Endocrinology Division, Santiago de Compostela University, Complejo Hospitalario Universitario, 15706 Santiago de Compostela, Spain

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## ABSTRACT

**Objective:** Elevated physical activity has been observed in some patients with anorexia nervosa (AN) despite their emaciated condition. However, its effects on treatment outcome remain unclear. This study aimed to examine objectively measured physical activity in this clinical population and how it might be related to a partial hospitalization therapy response, after considering potential confounders.

**Method:** The sample comprised 88 AN patients consecutively enrolled in a day hospital treatment program, and 116 healthy-weight controls. All participants were female and a baseline assessment took place using an accelerometer (Actiwatch AW7) to measure physical activity, the Eating Disorders Inventory-2 and the Depression subscale of the Symptom Checklist-Revised. Outcome was evaluated upon the termination of the treatment program by expert clinicians.

**Results:** Although AN patients and controls did not differ in the average time spent in moderate-to-vigorous physical activity (MVPA) ( $P = .21$ ), nor daytime physical activity ( $P = .34$ ), fewer AN patients presented a high physical activity profile compared to the controls (37% vs. 61%, respectively;  $P = .014$ ). Both lower levels of MVPA and greater eating disorder severity had a direct effect on a poor treatment outcome. Depression symptoms in the patients were associated with lower MVPA, as well as with an older age, a shorter duration of the disorder and greater eating disorder psychopathology.

**Conclusions:** There is a notable variation in the physical activity profile of AN patients, characterized by either low or very high patterns. Physical activity is a highly relevant issue in AN that must be taken into account during the treatment process.

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\* Corresponding author at: Department of Psychiatry and CIBEROBN, University Hospital of Bellvitge-IDIBELL, c/Feixa Llarga s/n, 08907 Barcelona, Spain. Tel.: +34 93 2607227; fax: +34 93 2607193.

E-mail addresses: [f.fernandez@bellvitgehospital.cat](mailto:f.fernandez@bellvitgehospital.cat), [f.fernandez@ub.edu](mailto:f.fernandez@ub.edu) (F. Fernandez-Aranda).

## 1. Introduction

Anorexia Nervosa (AN) is a severe and chronic Eating Disorder (ED) characterized by self-induced dieting, low body weight and an intense fear of gaining weight [2]. Baseline physical activity (PA) levels have been associated with longer treatment duration [48], poorer outcome when considered as less change in ED symptoms [16] and with an increased likelihood of dropout [20]. However, in other studies no influence has been observed on therapy response [51] or recovery rates [37]. Others have proposed as a relevant predictor the type of PA rather than the time spent in PA [1]. These authors found that a poor outcome was predicted by the time spent engaging in light PA (e.g. walking) rather than the time spent in intensive PA (e.g. swimming or running) [1].

The discrepancies in the literature assessing PA in EDs may be attributed to several factors. First, there is a lack of an operationalized definition of what elevated PA constitutes [40], the most common terms being: “hyperactivity” [30,51], “excessive/high level exercise” [6,44,46] and “compulsive exercise” [10,16]. Second, there are several methodological gaps in the evaluation of PA as some studies have used subjective instruments rather than objective measures. This is particularly important since subjective self-reports of PA have been found to be unreliable in patients with AN given that they seem to underreport/underestimate the amount of PA they engage in [8]. Third, some researchers have considered PA as a continuous variable, while others as a categorical construct [33].

The discrepancies in the literature concerning the possible effect of PA on treatment outcome might also be due to the heterogeneity of the therapy approaches and settings used in the treatment. Whereas in some studies PA was measured while the patients were in full-time inpatient hospitalization [51], in others the patients were receiving either inpatient or outpatient treatment [37] or a combination of inpatient and day hospital [1,16,20]. Additionally, in most of these studies the relevant variable depression was inconsistently considered. Although depressive symptoms is frequent in AN [23] and its inverse link to PA has been documented [4,32,53], previous studies have not taken it into account.

The present study attempts to overcome some of the aforementioned methodological gaps by using an objective instrument to examine various types of PA with a continuous measure approach, in a partial Day Hospital treatment, which is less restrictive in terms of PA and is a more realistic setting, and after considering those factors that may be influencing both PA and treatment outcome (such as depression symptoms).

The purpose of this study were twofold:

- to examine the differences between patients with AN and healthy-weight controls in terms of daytime PA levels and time spent in moderate-to-vigorous PA (MVPA);
- to assess the relationship between MVPA and treatment outcome and the potential modulating role of additional clinical variables.

The inconsistencies in the literature do not permit a hypothesis to be made on the effects of MVPA on treatment outcome. Nonetheless, it is expected that a subgroup of the AN patients in our sample will present particularly high levels of MVPA compared to the controls, and that MVPA levels in AN patients will be inversely associated with depression symptoms.

## 2. Methods

### 2.1. Participants

A total of 88 AN patients (BMI < 18.5 kg/m<sup>2</sup>) and 116 healthy eating/weight controls (HC) participated in the study. The AN

participants were patients consecutively admitted to the Day Hospital Treatment Program of the ED Unit at the University Hospital of Bellvitge, and were diagnosed according to the DSM-IV-TR criteria [3] by means of a semi-structured clinical interview (SCID-I) [25]. Of the AN patients, 52 were diagnosed with restrictive AN, 16 with purging AN and 20 with binge-purging AN. The mean age of onset of the AN was 21.2 years (SD = 8.4) and the mean duration of the disorder was 7.2 years (SD = 6.4); difference by group was not significant: control 27.5 – SD = 7.9, AN 27.9 – SD = 9.0,  $P = .74$ . All participants were female and Spanish speakers. The mean age of the HC was 27.5 years (SD = 7.9), while that of the AN patients was 27.94 (SD = 9) years. The body mass index (BMI) of the HC was 21.7 (SD = 2.8), while that of the AN patients was 16.6 (SD = 6.3).

Exclusion criteria for all the participants were:

- a history of a medical illness or neurological condition that could influence PA;
- being male;
- using psychoactive medications or drugs;
- being under 18 or over 60.

Controls were also excluded if they had suffered a lifetime ED. Face-to-face interviews employing a Structured Clinical Interview for DSM-IV-TR Axis I Disorders (SCID-I) [25] were carried out to detect possible ED diagnoses. The evaluation of general health or mental illnesses was based on the General Health Questionnaire-28 (GHQ-28) [28]. There were no statistical differences between AN-subtypes in mean age ( $P = .42$ ), age of onset ( $P = .68$ ), duration of the disorder ( $P = .10$ ) or Symptom Checklist-revised (SCL-90-R) [19] depression score ( $P = .09$ ).

The HC were recruited via word-of-mouth and advertisements at the local universities of the following centers (CIBERobn Spanish Research Network): Department of Diabetes, Endocrinology and Nutrition (Clinic University Hospital Virgen de Victoria, Malaga); Department of Endocrinology and Nutrition (University of Navarra, Pamplona); Hospital del Mar Medical Research Institute (IMIM, Barcelona) and Department of Basic Psychology, Clinic and Psychobiology (University Jaume I, Castellón). Enrolment took place between January 2010 and June 2013.

### 2.2. Treatment protocol

Following assessment and diagnosis, AN patients received treatment as usual, which consists in a manualized Day Hospital Program; previously described [22]. The program takes place from 9:00 h to 15:00 h during weekdays. It comprises supervised breakfast and lunch as well as group therapy covering nutritional and dietary patterns and psychological-psychiatric factors (cognitive restructuring, social skills training, body image therapy, stress management strategies, problem solving, art therapy). The day hospital treatment lasts around 12 weeks, based on a Cognitive-Behavioral Therapy approach, after which the patients continue regular, individual, therapy. The outcome of the day hospital intervention is classified by expert clinicians in terms of three categories based on the DSM-IV-TR criteria and described previously [15]:

- “full remission”, which signifies that the patient has reached a BMI greater or equal to 18.5 (threshold for a healthy-weight according to the World Health Organization), with an absence of both anorexic cognitions and bingeing/purging behaviors for a continuous period of time;
- “partial remission”, when the patients present a notable improvement in ED symptoms but there are still residual symptoms;

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