

# Accepted Manuscript



The MABIC project: An effectiveness trial for reducing risk factors for eating disorders

David Sánchez-Carracedo, Jordi Fauquet, Gemma López-Guimerà, David Leiva, Joaquim Puntí, Esther Trepát, Montserrat Pàmias, Diego Palao

PII: S0005-7967(15)30059-0

DOI: [10.1016/j.brat.2015.11.010](https://doi.org/10.1016/j.brat.2015.11.010)

Reference: BRT 2937

To appear in: *Behaviour Research and Therapy*

Received Date: 22 September 2014

Revised Date: 29 September 2015

Accepted Date: 23 November 2015

Please cite this article as: Sánchez-Carracedo, D., Fauquet, J., López-Guimerà, G., Leiva, D., Puntí, J., Trepát, E., Pàmias, M., Palao, D., The MABIC project: An effectiveness trial for reducing risk factors for eating disorders, *Behaviour Research and Therapy* (2015), doi: 10.1016/j.brat.2015.11.010.

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

## The MABIC project: An effectiveness trial for reducing risk factors for eating disorders

David Sánchez-Carracedo<sup>a, \*</sup>

David.Sanchez@uab.es

Jordi Fauquet<sup>a, b, c</sup>

Jordi.Fauquet@uab.cat

Gemma López-Guimerà<sup>a</sup>

Gemma.Lopez@uab.cat

David Leiva<sup>d</sup>

dleivaur@ub.edu

Joaquim Puntí<sup>a, e</sup>

Joaquim.Punti@uab.es

Esther Trepat<sup>f</sup>

etrepat@ipsicologia.cat

Montserrat Pàmias<sup>e, g</sup>

mpamias@tauli.cat

Diego Palao<sup>e, g</sup>

dpalao@tauli.cat

<sup>a</sup>Research Unit on Eating and Weight-related Behaviors, Dept. Clinical and Health Psychology, Universitat Autònoma de Barcelona, 08193, Bellaterra, Cerdanyola del Vallès, Barcelona, Spain

<sup>b</sup>Dept. Psychobiology and Methodology of Health Sciences, Universitat Autònoma de Barcelona, 08193, Bellaterra, Cerdanyola del Vallès, Barcelona, Spain

<sup>c</sup>Neuroimaging Research Group, IMIM (Hospital del Mar Medical Research Institute), Barcelona Biomedical ResearchPark, C/Doctor Aiguader, 88, 08003, Barcelona, Spain

<sup>d</sup>Dept. Methodology of Behavioral Sciences, Universitat de Barcelona, Passeig de la Vall d'Hebron, 171, 08035, Barcelona, Spain

<sup>e</sup>Mental Health Unit of the ParcTaulí Health Corporation, 08208, Sabadell, Barcelona, Spain

<sup>f</sup>Institute of Psychology Foundation, República Argentina, 182, 08023, Barcelona, Spain

<sup>g</sup>Dept. Psychiatry and Forensic Medicine, Universitat Autònoma de Barcelona, 08193, Bellaterra, Cerdanyola del Vallès, Barcelona, Spain\*Corresponding author.

---

### Abstract

Challenges in the prevention of disordered eating field include moving from efficacy to effectiveness and developing an integrated approach to the prevention of eating and weight-related problems. A previous efficacy trial indicated that a universal disordered eating prevention program, based on the social cognitive model, media literacy educational approach and cognitive dissonance theory, reduced risk factors for disordered eating, but it is unclear whether this program has effects under more real-world conditions. This effectiveness trial tested whether this program has effects when previously trained community providers in an integrated approach to prevention implement the intervention. The research design involved a multi-center non-randomized controlled trial with baseline, post-test and 1-year follow-up measures. The sample included girls in the 8th grade from six schools (n = 152 girls) in a city near Barcelona (intervention group), and from eleven schools (n = 413 girls) in four neighboring towns (control group). The MABIC risk factors of disordered eating were assessed as main outcomes. Girls in the intervention group showed

significantly greater reductions in beauty ideal internalization, disordered eating attitudes; and weight-related teasing and body dissatisfaction from pretest to 1-year follow-up compared to girls in the control group, suggesting that this program is effective under real-world conditions.

---

**Keywords:** Prevention; Disordered eating; Eating disorders; Effectiveness

Worldwide lifetime prevalence for eating disorders in young women is estimated at about 5% (Treasure, Claudino, & Zucker, 2010), according to the criteria of the Diagnostic and Statistical Manual of Mental Disorders (4th ed.; DSM-IV; American Psychiatric Association, 1994). Eating disorders are associated with some of the highest mortality rates for any psychological mental disorder (Arcelus, Mitchell, Wales, & Nielsen, 2011). In addition, disordered eating attitudes and behaviors, such as unhealthy weight-control practices or the desire to be thinner, are highly prevalent among adolescents worldwide (Austin et al., 2008; Calado, Lameiras, Sepulveda, Rodriguez, & Carrera, 2010; López-Guimerà et al., 2013). These behaviors and attitudes can have negative effects on both physical and psychosocial health (Larson, Neumark-Sztainer, & Story, 2009; Rawana, Morgan, Nguyen, & Craig, 2010) and increase the risk of weight gain, overweight status, and the development of clinical eating disorders (Field et al., 2003; Neumark-Sztainer et al., 2006; Patton, Selzer, Coffey, Carlin, & Wolfe, 1999). Regarding treatment resistance, attrition and non-response to the treatment of these disorders are much higher than desirable (Cooper & Fairburn, 2011; Schnicker, Hiller, & Legenbauer, 2013).

In sum, the high prevalence of eating disorders and disordered eating, together with their chronic tendency, high comorbidity with other mental disorders, association with serious physical and psychosocial health consequences and resistance to available treatments, constitute powerful reasons for an approach focused on their prevention.

A range of programs for the prevention of disordered eating have been developed in recent decades. Larger effects were found for programs with interactive exercises focused on risk factors for onset of eating pathology, with multiple sessions, that were assessed with validated measures, that were delivered by experts, and that targeted high-risk individuals (Stice, Shaw, & Marti, 2007). In general, prevention programs conducted with adolescents in this field have led to improvements in knowledge, though only a small number of such programs have succeeded in improving significant disordered eating attitudes and behaviors at follow-up (López-Guimerà, Sánchez-Carracedo, & Fauquet, 2011).

Recently, new challenges have been emerging in this field, including moving from efficacy to effectiveness and the integrated prevention of obesity and disordered eating. Prevention scientists distinguish between efficacy trials and effectiveness trials (Glasgow, Lichtenstein, & Marcus, 2003). *Efficacy* refers to the beneficial effects of a program or policy under optimal conditions of delivery (Flay et al., 2005), and involves the systematic and scientific evaluation of whether an intervention works. Efficacy is one of the two dimensions established by the American Psychological Association for the evaluation of its intervention guidelines (American Psychological Association, 2002). *Effectiveness* refers to the beneficial effects of a program or policy under more real-world conditions (Flay et al., 2005). It is the second dimension established by the APA, *clinical utility*, and refers to the applicability, feasibility and usefulness of the intervention in the local or specific setting in which it is implemented (American Psychological Association, 2002). An important feature of effectiveness is whether the intervention has been shown to be effective when delivery is by community providers (e.g., teachers), who have many competing demands on their time and attention every day, as opposed to experts or professional researchers (Hansen & Dusenbury, 2001).

Moving from efficacy to effectiveness trials in prevention research is necessary (Marchand, Stice, Rohde, & Becker, 2011), but examples of this transition in the disordered eating prevention field are scarce. To the best of our knowledge, only three programs have been evaluated with effectiveness trials. One is a targeted prevention program, The Body Project, whose efficacy (Stice, Marti, Spoor, Presnell, & Shaw, 2008) and effectiveness (Stice, Rohde, Gau, & Shaw, 2009) had been evaluated. Subsequent effectiveness trials have shown that the Body Project retains its effectiveness even when it is delivered in a universal format with college students from sororities (Becker, Smith, & Ciao, 2006). There are indeed two other universal prevention programs whose effectiveness has been evaluated when intervention is delivered by previously-trained teachers. One of them only showed positive changes in the measures of knowledge at follow-up (Wick, Bormann, Sowa, Strauss, & Berger, 2011). Evaluation of the results of the third program (Warschburger, Helfert, & Krentz, 2011) is still under way. Therefore, to the best of our knowledge, our study would be one of the few effectiveness trials in disordered eating universal prevention research with adolescents.

Our research team has developed and assessed a universal school-based disordered eating prevention program (López-Guimerà, Sánchez-Carracedo, Fauquet, Portell, & Raich, 2011). A detailed description can be found in the intervention manual (Raich, Sánchez-Carracedo, & López-Guimerà, 2008). The efficacy of the program was assessed under strong methodological conditions, including delivery conducted by two of the developers (GLG and DSC). The program was efficacious in generating positive changes in eating attitudes and beauty ideal influences at the 6-month follow-up. In 2009, a new research project was launched, setting out to assess the effectiveness of the aforementioned program in an effectiveness trial. The effect of the program will now be evaluated when delivered by previously-trained community providers. The project's name, the MABIC project, is a Spanish acronym for four risk factors of disordered eating with strong empirical support: "M" for media pressures and beauty-ideal internalization ("Medios de comunicación" in Spanish); "A" for dieting and disordered eating ("Alimentación alterada" in Spanish); "B" for weight-related teasing ("Burlas relacionadas con el peso" in Spanish); and "IC" for body dissatisfaction ("Insatisfacción Corporal" in Spanish).

Recent research supports that prevention interventions should not overlook the comorbid nature of obesity, disordered eating and poor psychosocial health (Loth, Wall, Larson, & Neumark-Sztainer, 2015). The training of community providers in the present study was based on this integrated approach to prevention.

The main aim of this study is to assess the effectiveness of a universal disordered eating prevention program for girls whose efficacy has been demonstrated previously. The effectiveness will be now evaluated when the program is delivered not by their developers, but by community providers previously trained in an integrated approach to the prevention of eating and weight-related disorders.

# 1 Methods

## 1.1 Study design

The study was a multi-center non-randomized controlled trial involving the measurement of a cohort of adolescent girls at baseline, post-test and 1-year follow-up. The study is registered in the ISRCTN (Sánchez-Carracedo, 2011; ISRCTN47682626), and was approved by the Clinical Research Ethics Committee of the Parc Taulí Health Corporation (PTHC). Family informed consent was requested prior to the study. Participants' assent was also requested.

## 1.2 Participants

The intervention was school-based. Schools are widely recognized as appropriate sites for interventions to prevent disordered eating among adolescents (Levine & Smolak, 2006; Yager, Diedrichs, Ricciardelli, & Halliwell, 2013). The total number of participants registered in class lists prior to baseline was 656 girls recruited from 17 schools, 12 public and five grant-aided private (GAP), all located in the area of Barcelona (Spain). The effective sample consisted of 565 adolescent girls (see Fig. 1). Six schools from the city of Sabadell, two public and four GAP, participated in the intervention group, providing a total number of 152 participants. The control group consisted of 413 adolescent girls from 11 schools located in four towns neighboring Sabadell, 10 public and one GAP. Total retention rates were 95% at post-test and 82.5% at follow-up. All participants were in the eighth-grade (second-grade in Spanish secondary education), with an age range of 13–14 years (mean = 13.83, SD = 0.53). Participants' origin was as follows: Spanish, 67.61%; European (non-Spanish), 2.48%; Latin American, 13.63%; African, 5.13%; mixed, 7.79%; and other, 3.36%. A complete description of the socio-demographic characteristics of the two groups appears in Table 1. Although the main focus of this study was on the girl participants, taking into account that boys also participated in the study (see end of the Procedures section), the description of the boys' socio-demographic characteristics can be found in the supplementary data files to this paper.

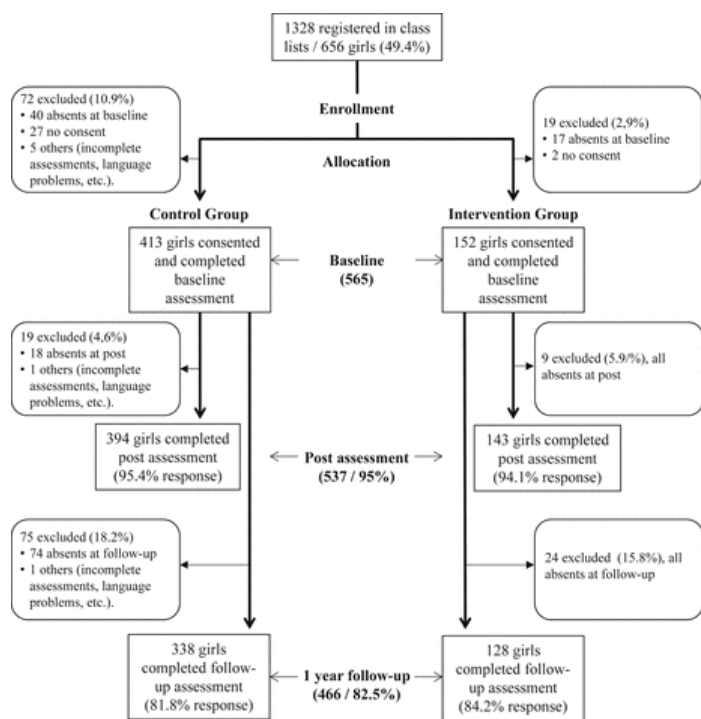


Fig. 1 Participant flow diagram of progress through the phases of the study.

Table 1 Baseline description of the sample by intervention condition, n (%) unless otherwise stated.

	Total (N = 565) <sup>a</sup>	Control (n = 413) <sup>a</sup>	Intervention (n = 152) <sup>a</sup>	p-value <sup>b</sup>
--	------------------------------	--------------------------------	-------------------------------------	----------------------

Age (M [SD])	13.83 (0.53)	13.87 (0.54)	13.73 (0.48)	<i>0.008</i>
BMI (M [SD])	21.22 (3.70)	21.39 (3.69)	20.76 (3.69)	0.076
Socioeconomic level				0.073
<i>Low</i>	60 (10.70)	51 (12.41)	9 (6.00)	
<i>Low-medium</i>	206 (36.72)	152 (37.98)	54 (36.00)	
<i>Medium</i>	149 (26.56)	111 (27.01)	38 (25.33)	
<i>Medium-high</i>	90 (16.04)	62 (15.09)	28 (18.67)	
<i>High</i>	56 (9.98)	35 (8.52)	21 (14.00)	
Origin				0.174
<i>Spanish</i>	382 (67.61)	280 (67.80)	102 (67.11)	
<i>European</i>	14 (2.48)	10 (2.48)	4 (2.63)	
<i>Hispanic</i>	77 (13.63)	52 (12.59)	25 (16.45)	
<i>African</i>	29 (5.13)	27 (6.54)	2 (1.32)	
<i>Mixed</i>	44 (7.79)	39 (7.26)	14 (9.21)	
<i>Other</i>	19 (3.36)	14 (3.39)	5 (3.29)	

Note. Italics indicates significance. BMI = body mass index.

<sup>a</sup> Numbers for the denominators down columns may show small incidental missingness.

<sup>b</sup> p-values are for comparisons between intervention and control groups at baseline.

### 1.3 Procedures

The study comprises two main phases: (1) development of training program and training of the community providers; and (2) implementation of the intervention, assessments and evaluation of their effectiveness.

Regarding the first phase, the training program schedule involved 5 face-to-face **3 h 3-h** three-hour sessions per week, including the following main content: (1) Concept of eating and weight-related problems, **3 h** 3-hours; (2) overweight, obesity and eating disorders (prevalence, causes, and consequences), **4.5 h** 4.5-hours; (3) effects of restrictive and fad diets, nutrition and eating habits, **1.52 h** 1.52-hours; (4) Media literacy, **3 h** 3-hours; and (5) how to implement the preventive program "Eating, the feminine beauty ideal and the media. How to train secondary-school students to be critical", **3 h** 3-hours. Additionally, accreditation of the training program took in to account 5 virtual hours where participants were required to read and prepare some activities. The training program addressed both teachers and health care professionals from the Health and School Program ([Government of Catalonia, 2012](#)) and the Health Promotion Service of Sabadell City Council. The Health and School Program was launched in October 2004 and is an initiative of the Catalanian Government's Department of Education and Universities and Department of Health to promote prevention and health and to improve the coordination of relevant action aimed at secondary-school students in public and GAP schools. The overall objective of this program is to improve the health of adolescents through initiatives in school settings by promoting health, the prevention of risk situations and early attention to health problems. Education in nutrition and the prevention of eating disorders is one of the main priorities. Primary care nurses participating in this program spent several hours per week in secondary schools working on these aspects. The PTHC is responsible for support and supervision in the specific areas of the Health and School Program in the city of Sabadell, and helped to facilitate the participation of nurses in the MABIC project. These health professionals would be responsible for delivering the Nutrition component of the preventive program. The Health Promotion technical staff at Sabadell City Council, who collaborate with the MABIC project and with nurses from the Health and School Program, would cover for nurses who could not deliver the planned interventions for various reasons. These health professionals were selected to deliver this component because of their specific training on education in nutrition. Teachers, the majority being secondary-school class tutors, would be responsible for delivering the Media Literacy component.

The training program was provided through the training plan section of the *Vallès Occidental* Center for Pedagogical Resources I, Sabadell, and was therefore offered to all professionals working in its area of influence. After the training program was advertised, a total of 63 community providers registered voluntarily and were trained, with the following distribution: 38 secondary school class tutors from 20 schools in Sabadell, 1 clinical psychologist, 7 Health Promotion technicians from Sabadell City Council, and 17 nurses from the Health and School Program. From among this trained staff, the project benefitted from the participation of 18 community providers linked to schools recruited in Sabadell and who were part of the intervention group: 11 secondary school

class tutors, 5 nurses from the Health and School Program, and 2 health promotion technicians from Sabadell City Council. The training program was officially accredited by the corresponding government departments.

Training sessions were run by the first and third authors of this paper. They are coauthors of the intervention program and made videos showing how they administered some components of the preventive intervention. These videos were given to the community providers participating in the MABIC project to be used as a model-guide. A copy of the intervention manual was provided to all participating community providers. The training program was based entirely on the integrated approach to eating and weight-related problems. Finally, the research team offered support and telephone and e-mail supervision throughout the whole process to those professionals requesting it.

As far as the second phase is concerned, participation in the project was offered to all schools from the participating localities, and was voluntary. The PTHC, as the only **specialized** public health care service in this area, has the ethical commitment to provide health care to the entire population, so that the possibility of participating in the group receiving the intervention should be offered to all secondary schools in the city. For these reasons, the intervention group was made up exclusively of schools located in the town of Sabadell. Populations from the two groups belong to the same region and are very close geographically. According to the official data ([Generalitat de Catalunya, 2013](#)), the two are very similar in socio-economic terms (foreign population, number of persons per household, Gross Domestic Product, etc.) and as regards economic activity, which is primarily related to services and the industrial sector.

Family consent and participants' assent were required prior to commencement of the study. Inclusion criteria for participants were provision of their consent and completion of the assessment protocol. No exclusion criteria were applied a priori, and full eighth-grade classes in the recruited schools participated. Participants with incomplete assessments or problems that might introduce relevant bias in the data would be excluded (see [Fig. 1](#)). The assessment protocol was administered at three points in the normal class schedule, with anonymity of the responses being guaranteed. Each assessment lasted about 60 **min-utes**. In the baseline and follow-up assessments, small groups of 6–8 participants were led to a private room while the questionnaires were being administered. There, trained staff took weight and height measures following a standardized procedure. Baseline assessments took place between January and March 2011 in both the intervention and control groups. Intervention began in each school one week after the baseline assessment, and a fidelity control of the program implementation was carried out (see Intervention section). The post assessment took place two weeks after completion of the intervention, between April and June 2011. Both assessments were carried out within the academic year 2010–11. Follow-up assessment took place in the following academic year, 2011–12, between February and March 2012.

In March 2013, community providers were required to complete a questionnaire for evaluating the training process and the project as a whole.

A screening for possible eating disorder cases was included in the assessment protocol. Scoring above the cut-off point of the ChEAT and SCOFF-c questionnaires (see Measures section) was used as criterion. In fulfillment of the ethical commitments of every public health care service, the Parc Taulí Health Corporation and those responsible at the schools were informed about possible further diagnosis and intervention in particular cases.

In order to maintain a natural atmosphere in class, the assessment and interventions involved both male and female participants, though as in the efficacy trial, the females' results were the main focus of this paper (results for the boys are available in the supplementary data files).

More details of procedures, training of the community providers, intervention, and measurements can be found in the published study protocol ([Sánchez-Carracedo et al., 2013](#)).

## 1.4 Intervention

The intervention was based on the social cognitive model ([Levine & Smolak, 2006](#)), the media literacy educational approach ([Center for Media Literacy, 2008](#)) and cognitive dissonance theory ([Stice, Shaw, Becker, & Rohde, 2008](#)). The intervention has two components ([Table 2](#)). The first component, nutrition, consists of two 60-min<sup>ute</sup> sessions. The main objective of this component is to increase knowledge about basic concepts in nutrition and food, correct false beliefs about food, and dissuade the participants from dieting. This knowledge is transmitted from a positive approach: It focuses on what students can enjoy rather than what they should avoid ([O'Dea, 2010](#)). In the second session the practical and relevant aspects of food are discussed through the analysis of four menus (one balanced and three unbalanced in carbohydrates, proteins and fats). The second component, media literacy, consists of three 60-min<sup>ute</sup> sessions plus three 60-min<sup>ute</sup> activity sessions. The presentations and group activities of this component are aimed at: (1) questioning the thinness ideal as a unique, healthy and objective ideal; (2) showing how to create a media message; and (3) developing critical thinking and active behaviors toward messages conveyed by the media.

**Table 2** Content and sequence of each of the Components in the Preventive Program.

Nutrition	Media literacy
<p><i>First session</i></p> <p>1. Eating and nutrition<sup>a</sup></p> <ul style="list-style-type: none"> <li>• Balanced eating concept</li> <li>• Concepts of eating and nutrition</li> <li>• Nutrients</li> </ul>	<p><i>Third session</i></p> <p>1. Feminine beauty ideal<sup>a</sup></p> <ul style="list-style-type: none"> <li>• Beauty throughout history</li> <li>• Recent changes in the criteria of beauty</li> <li>• Beauty in different cultures</li> </ul>

- Food pyramid and foods
- The importance of water

- Thinness in Western culture today

*Fourth and Fifth sessions*

2. The feminine beauty ideal in the media<sup>a</sup>
  - Analysis of advertising messages and transmission of values
  - What advertising hides from us
  - The comparison trap
  - Introduction of the first activity

*Sixth session*

3. Activity 1: advertising analysis
  - Guided critical analysis of an advertisement
  - Responding to a 10-question media literacy-based script

*Second session*

- Analysis of menus (one balanced and three unbalanced)

*Seventh session*

4. How to deal with media messages<sup>a</sup>
  - Groups complete and discuss the work done in Activity 1.
  - “You can do something”: How to develop active attitudes and behavior
  - Introduction of the second activity

*Eighth session*

5. Activity 2: complaint letters to the media
  - Preparing and writing a complaint letter
  - Giving the letter to one's tutor<sup>b</sup>

**Booster session** (Information about Booster Session seems to be located at "Nutrition" column in the Page Proof because absence of horizontal lines. It could be possible to align the Booster Session information to the center?)

- Summary of the main ideas transmitted in the *Media Literacy* component
- Looking back at Activity 2: complaint letters to the media
- Summary of the procedure for sending the letters and the main results:
  - Number of companies to which letters were sent
  - Most widely denounced advertisements

- Number of responses from the companies
- Summary of the main ideas reported
- Summary of the main ideas contained in the companies' response letters
- An answer model: Response letter from Philips

<sup>a</sup> Power Point presentation.

<sup>b</sup> The researchers collected and sent the letters to advertisers.

Nine months after completion of the intervention there was a 60-minute booster session aimed at refreshing memories of the main ideas conveyed in the program and providing feedback about the last activity carried out. Duration of the program is one session per week for eight weeks, plus one booster session. All sessions took place during the scheduled weekly tutor group sessions at each school. The format is multimedia and interactive. To check the fidelity in the administration of the program the researchers contacted those responsible at each school and checked that all scheduled sessions had been carried out.

## 1.5 Measures

All questionnaires used are those most widely employed for determining targeted variables in disordered eating universal prevention research worldwide (Yager et al., 2013).

### 1.5.1 Biographical data questionnaire

The MABIC protocol included Hollingshead's (1975) Four Factor Index of Social Status (FFISS), together with questions about the origin of the parent population and date of birth.

### 1.5.2 Body mass index (BMI)

Weight and height were measured in situ by trained research staff in a private room near the protocol administration classroom. Standardized equipment and procedures were employed. BMI was calculated. Weight and height measures were taken only at pretest and at the one-year follow-up.

### 1.5.3 Sociocultural attitudes toward appearance questionnaire–3 (SATAQ-3)

The SATAQ-3 (Thompson, van den Berg, Roehrig, Guarda, & Heinberg, 2004) is the instrument most widely used today for assessing sociocultural pressures and internalization of the beauty ideal. Internalization General (SATAQ-IG) and Pressures (SATAQ-P) subscales were used. SATAQ-IG has nine items (e.g., "I try to look like the people on TV"), and assesses general media influence related to TV, magazines, and movies. SATAQ-P has seven items (e.g., "I've felt pressure from TV or magazines to diet"), which assesses subjective feelings of pressure from exposure to media images and messages to modify one's appearance. We used the Spanish version of the SATAQ-3 (Sánchez-Carracedo, Barrada, et al., 2012; Sánchez-Carracedo, Neumark-Sztainer & López-Guimerà, 2012). In this study, the internal consistency was 0.94 and 0.92 for the SATAQ-IG and SATAQ-P scales, respectively.

### 1.5.4 Children eating attitudes test (ChEAT)

The ChEAT (Maloney, McGuire, & Daniels, 1988) is a well-established scale including 26 items (e.g., "I feel guilty after eating") designed to assess maladaptive or problematic eating attitudes and behaviors among children and adolescents. We used the validated Spanish version (Sancho, Asorey, Arija, & Canals, 2005). The internal consistency was 0.83 in this study.

### 1.5.5 Perception of teasing scale (POTS)

The POTS (Thompson, Cattarin, Fowler, & Fisher, 1995) assesses one's history of being teased about weight and abilities/competencies. The original scale yields a six-item weight-related teasing subscale (POTS-WT; e.g., "People made jokes about you being too heavy"). The Spanish validated version of the POTS-WT subscale (López-Guimerà et al., 2012) was used for this study. Internal consistency was 0.88.

### 1.5.6 Eating disorders inventory-3 (EDI-3)

We used the Body Dissatisfaction (EDI-BD) and Drive for Thinness (EDI-DT) subscales from the EDI-3 (Garner, 2004) in its Spanish version (Elosua, López-Jáuregui, & Sánchez-Sánchez, 2010). The EDI-BD scale contains 10 items that measure



satisfaction with specific body sites, such as the waist, thighs, and buttocks. The EDI-DT is a seven-item scale that measures restrictive tendencies, including excessive concern with dieting, weight concerns, and pursuit of thinness. Internal consistency in this study was 0.85 and 0.86 for the EDI-BD and EDI-DT subscales, respectively.

### 1.5.7 SCOFF-c

The Spanish version of the SCOFF (Morgan, Reid, & Lacey, 1999), the SCOFF-c (Muro-Sans, Amador-Campos, & Morgan, 2008), was used as a screening tool for possible cases of eating disorders. It consists of five questions that represent the current consensus on the main features of eating disorders. It is one of the most prestigious eating disorders screening questionnaires currently in use, given both its ease of application and its good psychometric properties. Each item is answered in a dichotomous way (Yes/No). In the Spanish version, scores  $\geq 2$  are considered to indicate risk for eating disorders, with a sensitivity of 73.08% and a specificity of 77.74%. Internal consistency was 0.64 in this study.

### 1.5.8 Positive and Negative affect scale (PANAS-N)

We used the 10-item "Negative Affect Scale" (PANAS-N) of the PANAS (Watson, Clark, & Tellegen, 1988) in its validated Spanish version for children and adolescents (Sandin, 2003). Respondents are required to respond in accordance with how they normally feel and/or behave (e.g., guilty, shameful, nervous) on a scale with three options; "Never", "Sometimes", and "Often". Internal consistency of this instrument is 0.75 to 0.74 for both girls and boys, and in our study it was 0.80.

### 1.5.9 Rosenberg self-esteem scale (RSES)

The RSES (Rosenberg, 1989) was used to measure adolescent self-esteem. It is among those instruments most widely used for measuring changes in self-esteem in disordered eating universal prevention research worldwide (Yager et al., 2013). The 10-item scale has a 4-point Likert-type response scale ranging from 1 (strongly disagree) to 4 (strongly agree). We used the Spanish validation (Martín-Albo, Núñez, Navarro, & Grijalvo, 2007), which has an internal consistency of 0.85 to 0.88. Internal consistency in this study was 0.76.

### 1.5.10 Ad hoc questionnaire for the evaluation of processes

Community providers were asked about the training, program administration and the project in general.

## 1.6 Statistical analysis

Because adolescents within the same schools will likely display similar correlated values in several variables, in line with, among other factors, the influence of teachers or peers, data analysis was performed using Generalized Estimating Equations (GEE; Liang & Zeger, 1986; Zeger & Liang, 1986), which extends generalized linear models to accommodate dependent/correlated outcomes for clustered data (school in this study). The GEE approach uses the generalized linear model to estimate more efficient and unbiased regression parameters relative to ordinary least squares regression, in part because it permits specification of a "working correlation matrix" that accounts for the form of within-subject correlation of responses for the dependent variables of many different distributions. This orientation focuses on correlated data arising from the relatedness of several individuals in the same cluster or panel (school in this study), rather than several "longitudinal" observations in the same individuals (Dunlop, 1994; Hanley, Negassa, Edwardes, & Forrester, 2003).

From this perspective, the data analysis strategy is based on defining school as a panel variable, and models are adjusted with the normal distribution (Gaussian family) and identity link-function, exchangeable working correlation matrix, and employing robust standard error. Because the outcome variable has to be considered at three points (baseline, post-test, and 1-year follow-up), evaluation of the effects of the intervention will be conducted in two phases. First, we study the effect on outcome at post-test taking outcome at baseline as a covariate in addition to group (control/intervention), BMI, age, socioeconomic status and origin of the parent population; subsequently, we apply the same strategy on outcome at the 1-year follow-up. Effect size measures were obtained following the guidelines stated by Feingold (2009), and they can be interpreted by means of Cohen's criteria (1988); 0.2 indicated a low effect, 0.5 a medium effect and 0.8 a high effect. All analyses are performed with Stata 12/SE.

## 2 Results

Table 3 shows the intervention effect on the components of the MABIC project: media messages internalization and pressures, dieting and disordered eating, weight-related teasing, and body dissatisfaction. Table 3 also shows the intervention effect on other outcomes, such as drive for thinness, negative affect, and self-esteem. At posttest, all changes were in the hypothesized direction, except in the cases of SATAQ-P and EDI-BD, though none reached statistical significance.

**Table 3** Means (standard deviations) and intervention effect estimates.<sup>a</sup>

	M	Test of intervention effects	
		Posttest	Follow-ups

		Baseline M (SD)	Posttest M(SD)	Follow-up M (SD)	$M_A^b$	Intervention effect <sup>a</sup> (There is too much space between "Intervention effect" and "d" columns and too few space between "b" and "CI(0.95)" columns, both in Posttest and Follow-ups (see Page Proof))	$P_p$	CI (0.95) (In the page proof some CI (0.95) data are in the same line. It could be possible to put all the CI (0.95) in the same line?)	d	$M_A^b$	Intervention effect <sup>a</sup>	p	CI (0.95) (In the page proof some CI (0.95) data are in the same line. It could be possible to put all the CI (0.95) in the same line?)	d
SATAQ-IG (It could be possible to put SATAQ-IG in the same line?)	Con	19.01 (9.89)	18.86 (9.96)	19.46 (10.25)	18.69	-0.36	0.670	-2.03 to 1.30	-0.15	19.27	-1.69	0.029	-3.20 to -0.17	-0.71
	Int	18.20 (10.09)	18.26 (10.80)	17.32 (8.99)	18.33					17.58				
SATAQ-P (It could be possible to put SATAQ-P in the same line?)	Con	12.26 (6.62)	12.06 (6.23)	12.34 (6.94)	11.85	0.51	0.159	-0.20 to 1.23	0.21	12.21	-0.85	0.046	-1.69 to -0.02	-0.36
	Int	11.34 (5.94)	12.20 (7.13)	11.16 (6.19)	12.36					11.36				
ChEAT	Con	8.54 (9.14)	8.04 (9.40)	8.41 (9.69)	7.84	-0.67	0.268	-1.85 to 0.51	-0.28	8.41	-2.24	0.018	-4.09 to -0.39	-0.94
	Int	8.01 (7.88)	7.11 (8.26)	6.19 (7.30)	7.17					6.17				
POTS-WT (It could be possible to put POTS-WT in the same line?)	Con	7.20 (6.99)	6.74 (6.53)	6.94 (6.48)	6.73	-0.14	0.679	-0.81 to 0.53	-0.06	6.98	-0.73	<0.001	-1.16 to -0.30	-0.31
	Int	7.26 (6.91)	6.57 (6.52)	6.19 (5.99)	6.59					6.25				
EDI-BD	Con	12.61 (9.35)	11.82 (9.31)	12.50 (9.32)	11.51	0.05	0.914	-0.85 to 0.95	0.02		-0.52	0.270	-1.43 to 0.40 (In the page proof these data are in the same line. It could be possible to put all the CI (0.95) in the same line?)	-0.22
	Int	10.91 (8.56)	10.72 (8.44)	10.88 (9.51)	11.56					11.72				
EDI-DT	Con	8.33 (7.26)	7.80 (8.06)	8.00 (7.79)	7.58	-0.44	0.148	-1.03 to 0.16	-0.18	7.91	-0.54	0.291	-1.54 to 0.46 (The word "to" is located in the first line in all CI (0.95) that appears at the same line in the Page Proof. Maybe doing the same in all CI	-0.23
	Int	7.71 (6.98)	6.96 (7.28)	7.20 (7.20)	7.14					7.37				

																(0.95) data (both in post and follow-ups columns) all the CI (0.95) will be in one single line.)
PANAS-N (it could be possible to put PANAS-N in the same line?)	<i>Con</i>	17.69 (3.75)	17.49 (3.88)	18.33 (3.73)	17.45	-0.30	0.313	-0.87 to 0.28	-0.13	18.34	-0.74	0.091	-1.59 to 0.12	-0.31		
	<i>Int</i>	17.17 (3.59)	16.98 (3.51)	17.29 (3.45)	17.15					17.61						
RSES	<i>Con</i>	26.34 (6.42)	27.69 (7.03)	27.37 (6.71)	27.82	0.11	0.601	-0.23 to 0.55	0.02	27.60	0.64	0.197	-0.33 to 1.61	0.10		
	<i>Int</i>	27.19 (5.96)	28.24 (6.35)	28.59 (6.27)	27.93					28.24						

Note. Italics indicates significance; M(SD) = means (standard deviation);  $M_A$  = adjusted mean;  $p$  = p-value; CI(0.95) = confidence interval at 95%;  $d$  = effect size; SATAQ-IG = Internalization-General sub-scale of the SATAQ questionnaire; SATQ-P = Pressures sub-scale of the SATAQ questionnaire; ChEAT = Children Eating Attitudes Test; EDI-DT = Drive for Thinness subscale from the Eating Disorders Inventory-3; POTS-WT = Weight-Related Teasing subscale from the POTS scale; EDI-BD = Body Dissatisfaction subscale from the Eating Disorders Inventory-3; PANAS-N = Negative Affect Scale from the Positive and Negative Affect Scale; RSES = Rosenberg Self-Esteem Scale.

<sup>a</sup>  $n = 413$  girls in the control condition and 152 girls in the intervention condition.

<sup>b</sup> Adjusted means for each outcome by treatment condition.

<sup>c</sup> Intervention effects are estimates that represent the difference in the outcome variable at post-class or follow-up in intervention condition compared to control condition, adjusted for outcome at baseline, BMI, age, socioeconomic status and origin.

At follow-up, the girls in the intervention group showed a significant reduction in the hypothesized direction in 4 out of 8 risk factors of disordered eating of the MABIC program with effect sizes ranging from small to large (POTS-WT,  $d = -0.31$ ; SATAQ-P,  $d = -0.36$ ; SATAQ-IG,  $d = -0.71$ ; ChEAT,  $d = -0.94$ ).

Specifically, with respect to the effect on the media messages internalization and pressures assessed by means of the SATAQ-3 (the "M" of MABIC), the intervention girls showed significantly lower average levels than the control girls in the SATAQ-IG ( $p = 0.029$ ) and the SATAQ-P ( $p = 0.046$ ) subscales. Regarding dieting and disordered eating (the "A" of MABIC), the intervention girls scored significantly lower than the control girls in the ChEAT ( $p = 0.018$ ), with a mean difference of 2.24 points. The impact of the program on the weight-related teasing component (the "B" of MABIC) showed a statistically significant effect in the POTS-WT subscale ( $p < 0.001$ ) so that, at follow-up, the intervention girls presented lower mean scores than the control girls. The intervention's effects for the body dissatisfaction scale (the "IC" of MABIC) were non-significant. No significant differences were found between the control and intervention groups at follow-up regarding other general outcomes, such as drive for thinness ( $p = 0.291$ ), negative affect ( $p = 0.091$ ) and self-esteem ( $p = 0.197$ ).

BMI means for the entire sample were 21.2 (SD = 3.7) at baseline and 21.5 (SD = 3.4) at the follow-up. It is important to stress that the effects of the intervention occurred in the absence of significant differences in BMI between pretest and follow-up (differences in BMI between the two phases for both samples of girls and boys were modeled; the results are available in the supplementary material). Therefore the observed reductions in main measures cannot be attributed to weight loss.

No unintended harmful effects were observed in boys (table showing intervention effects in participating boys are available in the supplementary data files).

The process evaluation revealed that community providers informed – in a 1 to 10-point scale – that the mean interest shown by the participants was 7.4 (SD = 1.4; scores ranging from 6 to 10), the mean level of usefulness of the training received to administer the program was 8.0 (SD = 0.82; scores ranging from 7 to 9), the mean level of satisfaction with regard to their own administration was 7.3 (SD = 1.38; scores ranging from 5 to 9), the mean degree of satisfaction with the management of the project by those responsible for it was 8.2 (SD = 1.2; scores ranging from 7 to 10), and the mean level of overall satisfaction with the project was 8.0 (SD = 1.2; scores ranging from 6 to 9). The aspects of the training that helped them most in the administration of the program were the program training, followed by the program manual. Finally, all of them had continued implementing the program once the project was finished. All planned sessions were carried out in all participating schools.

### 3 Discussion

It is of crucial importance to carry out effectiveness trials that test whether interventions are effective when delivered under ecologically valid conditions, as opposed to tightly controlled research trials (Marchand et al., 2011). Our prevention program has shown its effectiveness when implemented by community providers in three of the four MABIC risk factors of disordered eating assessed (media messages internalization and pressures, dieting and disordered eating, and weight-related teasing) at 1-year follow-up. To date, just 51% of the preventive programs in this field have achieved significant reductions in at least one well-established risk factor for eating pathology (Stice et al., 2007), and less than a third of universal programs have obtained positive results in the follow-up (López-Guimerà et al., 2011). The most relevant effect at follow-up was found for reductions in dieting and disordered eating and media messages internalization, targets directly addressed by the intervention program, with higher effect sizes.

Non-significant effects were found for body dissatisfaction, drive for thinness, negative affect, and self-esteem. A non-significant effect for body dissatisfaction, one of the main MABIC outcomes and one of the most relevant outcomes in disordered eating prevention studies, is the main weakness of our results. This is not a new result. A set of classroom-based prevention programs that did not show significant improvements on body image measures, but were shown to significantly improve other outcomes, have been identified in a systematic review (Yager et al., 2013). Perhaps this result could be related to the program format. The results of our previous efficacy study highlighted the key role played by the activities on the positive effects of the program. The activities are focused on how to deal with media messages and learning to write complaint letters to the media. Both activities are aimed at developing critical thinking and active behaviors toward messages conveyed by the media, and have had a positive impact on the reduction of directly-related outcomes (SATAQ-G and SATAQ-P). Future improvements of the program should include additional activities directly aimed at reducing body dissatisfaction.

An important limitation in this field concerns the long-term maintenance of the effects obtained. However, our results indicate that the significant effects are observed only in the follow-up. This tendency was already observed in the original study in which the efficacy of the program was evaluated (López-Guimerà et al., 2011; López-Guimerà, Sánchez-Carracedo, Fauquet, Portell, et al., 2011). A possible explanation is that attitudes involving the internalization of the beauty ideal or weight concerns may already be firmly entrenched in adolescents, so that their modification can take some time. Another factor that may have contributed to the results observed is the programming of a booster session, considered as one of the key elements for achieving the best long-term results (Stice, South, & Shaw, 2012). Booster sessions are usually included in prevention interventions for maintaining and enhancing the intervention effects, but may also be important in obtaining promising effects from the initial interventions (Tolan, Gorman-Smith, Henry, & Schoeny, 2009). Our booster session focused on recall of the main ideas conveyed in the program, but also provided feedback about the last activity of the media literacy component. This component is based on the "empowerment spiral" model for developing media literacy skills (Center for Media Literacy, 2008), and includes Awareness, Analysis, Reflection and Action steps. The Action step, the focus of the last session of our program, gives participants an opportunity to formulate constructive action ideas, and could be developed in several ways. We opted to teach the participants how to write complaint letters to the media. After the end of the program we sent the letters to the addressee. Once we had received the responses, we planned the booster session, in which we looked at the companies' responses to the letters of complaint written by the participants in the final session, with a view to strengthening their activism behavior and increasing their self-efficacy beliefs. The participants had the opportunity to check that major companies had attended to their letters of complaint, which could play a role in achieving significant effects in the follow-up. In this sense, our booster session could act more as a new key intervention session rather than merely as a booster for the main ideas. In fact, whether or not to introduce new treatment content and/or select new or revised treatment goals in the booster sessions is an issue of current debate (Kolko & Lindheim, 2014).

It is important to note that all of these results are observed with retention rates of 82.5% in the follow-up, which is among the highest rates in this field of study (López-Guimerà et al., 2011).

Schools are recognized as an appropriate setting for the prevention of a broad spectrum of eating and weight-related problems because they allow access to a large number of individuals and provide an opportunity to prevent these problems at every developmental stage (Yager et al., 2013). In this context, teachers and other community providers should be those chiefly responsible for the administration of this type of preventive intervention (Smolak, Harris, Levine, & Shisslak, 2001; Yager & O'Dea, 2005). However, data from a meta-analytic review (Stice et al., 2007) show that larger effects were found for programs delivered by experts than for those delivered by endogenous providers such as teachers. Our previous efficacy study (López-Guimerà et al., 2011; López-Guimerà, Sánchez-Carracedo, Fauquet, Portell, et al., 2011) was delivered by expert developers of the program, while this effectiveness study was delivered by previously trained community providers. Regrettably, we cannot make direct comparisons of the results because of the different measures used in the two studies. In the efficacy study, only measures about eating attitudes and beauty media influences were included, and different instruments were used to assess them (our Spanish version of the SATAQ-3 had not yet been produced). Taking into account these considerations, contrary to the findings of Stice et al. (2007), effect sizes were higher in the effectiveness study than in the previous efficacy study. We found medium-low effects in eating attitudes ( $d = 0.29-0.37$ ) and media influences ( $d = 0.38-0.45$ ) in the efficacy study, and high ( $d = 0.94$ ) and medium-high ( $d = 0.36-0.71$ ) effects in the respective outcomes in the effectiveness study. The better results found in the effectiveness study could be attributed to better sensitivity for detecting changes in measures used. An alternative explanation is that the effectiveness study was implemented in a more intensive and interactive way. In the efficacy study, the program was implemented in five sessions: one group session for the nutrition component, and four sessions for the media literacy component, including two activity sessions. In the effectiveness study, the program was implemented in eight sessions, including one additional activity session in the nutrition component and three activity sessions in the media literacy component. This latter version of the implementation was more intensive and with a more interactive format, and this can result in greater effectiveness in producing lasting changes in eating attitudes and behaviors (Stice et al., 2007). They are two additional explanations to this result. The booster session in the efficacy study was administered after the follow-up assessment. In this sense, the effects observed in the effectiveness study are based on a program that includes a booster session and the efficacy study did

not. Also, as has been already mentioned, the booster session might have played a relevant role in the observed effects. Finally, the efficacy study was a randomized study, and non-randomized studies, such as our effectiveness study, tend to show larger treatment effects (Ioannidis et al., 2001).

It might be thought that professionals such as teachers are qualified to implement programs for the prevention of disordered eating. However, several studies have indicated that knowledge among school staff and other community providers about nutrition, eating disorders, issues related to the mechanisms of weight control, obesity and the use of preventive techniques is poor or insufficient (Yager, 2010). Because of this lack of knowledge, these professionals may unintentionally provide participants with inappropriate advice and/or misinformation about healthy weight control and display attitudes and behaviors that perpetuate the thinness ideal (Yager, 2010). Therefore, developing appropriate attitudes and knowledge in relation to eating disorders among teachers and other community providers through training programs is an essential component in the effectiveness of prevention programs. To our knowledge, only three programs assessed with effectiveness trials, in addition to our own, have developed training programs aimed at teachers and other community providers that equip them to implement prevention programs in this field (Stice et al., 2009; Warschburger et al., 2011; Wick C. et al., 2011). In particular, our training program includes all the elements identified by teachers as necessary for involvement in the administration of such interventions (Neumark-Sztainer, Story, & Collier, 1999; Smolak et al., 2001): (1) in order to increase their motivation, information on the need to carry out this type of intervention was included when the training began; (2) updated information on the issues to be addressed in the program was incorporated; (3) participation was voluntary and intervention was implemented only by motivated community providers; (4) community providers had the support of their management teams and the relevant training was officially accredited; (5) useful materials for implementing the intervention were provided, such as the program manual, the video-model and informational documents about the most relevant content and techniques; and finally, (6) we maintained constant supervision so as to be able to deal with any questions or problems arising and help them feel supported. It is important to stress that the training program was officially accredited by the corresponding government departments. This accreditation provides benefits for community providers in their professional promotion, and is a way to facilitate the dissemination of the program.

The program was very highly rated by the community providers who received the training and implemented the intervention, and their level of satisfaction with regard to their own performance on administering the program was also high. The most highly rated aspect of the training was the training program itself, followed by the manual provided. Another indication of how well the program was received is that all the community providers reported having continued to apply it even after their participation in the project was over. The Health Promotion Service of the council of Sabadell, the city in which the program was applied, has extended its application to some ten more schools, while those responsible for the Health and School Program in the towns making up the control group have applied for their personnel to be trained with the same program as that offered to the staff in Sabadell.

Our study incorporates some elements of the integrated approach to the prevention of eating and weight-related disorders. In terms of the content of the program itself, it includes a component totally devoted to promoting a balanced diet with a positive approach to nutrition education. Furthermore, the training of community providers is implemented entirely from this approach. And finally, regarding the variables assessed, it incorporates a set of relevant variables of disordered eating risk factors (the MABIC outcomes) that are also referred to as shared risk factors of obesity and eating disorders (Loth et al., 2015). However, the study also assesses other outcomes usually included in studies on the efficacy of disordered eating prevention programs, such as drive for thinness, and does not include other typical outcomes in obesity prevention studies, such as screen time, physical activity, or dietary patterns. In order to consider our study as an integrated prevention study, it should also have been included this latter type of outcome. The integrated approach to prevention defends a focus on health, not on weight (Sánchez-Carracedo, Neumark-Sztainer et al., 2012). In this regard, it is important to stress that the effects of the intervention occurred in the absence of differences in BMI. Therefore, the observed reductions in main outcomes cannot be attributed to weight loss.

The current pretest study has a number of strengths: (1) to our knowledge, it is the first effectiveness trial in disordered eating universal prevention research addressing adolescents whose efficacy has been previously established. Our results support the transition from efficacy to effectiveness in this prevention field; (2) the training program for the community providers includes all the elements identified by teachers as necessary for involvement in the administration of such interventions; (3) it incorporates several elements of the integrated approach to the prevention of both obesity and eating disorders; (4) the measures employed to assess effectiveness are among those most widely used to determine changes in the disordered eating and body image prevention field worldwide, and have been validated for the Spanish population; (5) finally, height and weight were measured in situ, in contrast to the case of many studies with adolescents that rely on self-reported height and weight data.

A series of limitations should also be considered in relation to this study. (1) Changes in main measures should also assess the community providers, but this was prevented by practical considerations. (2) In contrast to our efficacy trial, in the effectiveness trial the randomization of groups was not possible. This is a controversial issue. The effects of randomized and non-randomized studies are very well correlated, but non-randomized studies tend to show larger treatment effects (Ioannidis et al., 2001). For some researchers, for a program to be found effective, it must also meet all standards for efficacy, including randomization (Flay et al., 2005), but sometimes randomization is impossible under real-world conditions (Marchand et al., 2011). Randomization, or even being able to have a control group, is difficult to attain due to the requirements of the participating entities. The use of participants from a neighboring area with characteristics similar to those of the intervention group as a control group, as in our case, is an option already used in other effectiveness trials in prevention (Zubrick et al., 2005). This option can help avoid a "spillover" effect, and possible demographic differences could be controlled with strategies in place to match samples for demographic characteristics, or through covariate analyses (Yager et al., 2013). It should be noted that our results were adjusted in line with the main variables, and adjusted results from non-randomized experiments can approximate results from randomized experiments (Shadish, Clark, & Steiner, 2008). However, we cannot guarantee the total comparability of the two groups. (3) In our previous efficacy study, two versions of the same program, including a complete version and a partial version without the Nutrition component, were evaluated. In general, the complete version obtained better results than the partial version in main outcomes. Practical considerations made it difficult to maintain this complex design in our effectiveness study, but evidence about the efficiency of the extra time and effort involved in delivering the Nutrition component would be necessary in the future. (4) The

sample in this effectiveness trial is not representative of the entire population of Spanish adolescent girls, and the results we obtain must be treated with caution before making generalizations for the entire population. (5) The intervention was designed specifically for girls, but was implemented with the entire class-groups, including both girls and boys. Our findings ensure that the intervention did not have unintended harmful effects on boys, but it would be of interest to develop specific components of the intervention addressed to boys, and to assess their effects. Given that significant effects were not observed on boys, it could be stated that the program is not really universal, but it is a program that can be universally administered to girls regardless of risk status. (6) Finally, the intervention failed in achieving significant changes in body dissatisfaction, one of the four main MABIC outcomes.

The Society for Prevention Research has drawn up Standards (Flay et al., 2005) to determine which interventions are efficacious and effective. An effective intervention in accordance with these Standards will not only meet all the criteria for efficacious interventions, but will also: (1) make manuals, appropriate training, and technical support available to allow third parties to adopt and implement the intervention; (2) have been evaluated under real-world conditions in studies that included sound measurement of the level of implementation and engagement of the target audience (in both the intervention and control conditions); (3) have indicated the practical importance of intervention outcome effects (i.e., including confidence intervals of the effects); and (4) have clearly demonstrated to whom intervention findings can be generalized. Our prevention program met the Standards for efficacy in our efficacy trial (López-Guimerà et al., 2011; López-Guimerà, Sánchez-Carracedo, Fauquet, Portell, et al., 2011). Our ongoing effectiveness trial already meets the criteria of the first three Standards for effective interventions; regarding the fourth, as we stated, the sample in this effectiveness trial is not representative of the entire population of adolescent girls. It is important to bear in mind that participation was voluntary, and that it is very difficult to obtain the participation of a representative sample in a study with such stringent requirements, including that of the need for community providers to take part in a training program. Even so, 26% of all possible schools participated in the intervention group, and 44% in the case of the control group, which represents a substantial level of participation. However, it is important to take into account that participation was voluntary. We have no specific data about possible differences between participating intervention schools and schools that were invited to participate but declined, which is why we cannot reject any potential biases associated with participation and the total generalizability of the findings to the entire population.

Our prevention study employs a universal approach focused on main effects, but it would be of interest to analyze effects on specific risk groups. Changes in main measures should also assess the community providers. Future studies should examine the specific role of the booster sessions that include new treatment content and/or new or revised treatment goals in relation to the follow-up effects, and take into consideration an ecological approach including the participation of community providers, peers and parents. Finally, it would be of interest to study possibilities of dissemination of the program as a next step.

In conclusion, this study provides new evidence that contributes to improving and enhancing the transition from efficacy to effectiveness in disordered eating prevention programs.

## Funding source

The MABIC Project and preparation of this article was supported by Research Grants from Ministry of Science & Innovation (PSI2009-08956) and Ministry of Economy and Competitiveness (PSI2012-31077) of the Spanish Government.

**Acknowledgements** (if possible, we would like to add this section.)

The authors would like to thank the participants for their involvement in the study, and the community providers (class tutors of the participating secondary schools, nurses from the Health and School Program, and Health Promotion technicians from Sabadell City Council) for their participation in the training and the implementation of the program.

## Appendix A. Supplementary data

Supplementary data related to this article can be found at <http://dx.doi.org/10.1016/j.brat.2015.11.010>.

## Uncited references

~~Price, Desmond, Ruppert, & Stelzer, 1987.~~

## References

- American Psychiatric Association, Diagnostic and statistical manual of mental disorders, 4th ed., 1994, Washington, DC.
- American Psychological Association, Criteria for evaluating treatment guidelines, *American Psychologist* **57** (12), 2002, 1052–1059, <http://dx.doi.org/10.1037//0003-066X.57.12.1052>.
- Arcelus J., Mitchell A.J., Wales J. and Nielsen S., Mortality rates in patients with anorexia nervosa and other eating disorders a meta-analysis of 36 studies, *Archives of General Psychiatry* **68** (7), 2011, 724–731, <http://dx.doi.org/10.1001/archgenpsychiatry.2011.74>.
- Austin S.B., Ziyadeh N.J., Forman S., Prokop L.A., Keliher A. and Jacobs D., Screening high school students for eating disorders: results of a national initiative, *Preventing Chronic Disease* **5** (4), 2008, A114A–114.

- Becker C.B., Smith L.M. and Ciao A.C., Peer-facilitated eating disorder prevention: a randomized effectiveness trial of cognitive dissonance and media advocacy, *Journal of Counseling Psychology* **53** (4), 2006, 550–555, <http://dx.doi.org/10.1037/0022-0167.53.4.550>.
- Calado M., Lameiras M., Sepulveda A.R., Rodriguez Y. and Carrera M.V., The mass media exposure and disordered eating behaviours in Spanish secondary students, *European Eating Disorders Review* **18** (5), 2010, 417–427, <http://dx.doi.org/10.1002/erv.1024>.
- Center for Media Literacy, Literacy for the 21st century: An overview & orientation guide to media literacy education, 2008, Retrieved from [http://webspace.ship.edu/hliu/etextbook/theory/doc/media\\_literacy\\_v02.pdf](http://webspace.ship.edu/hliu/etextbook/theory/doc/media_literacy_v02.pdf).
- Cohen J., Statistical power analysis for the behavioral sciences, 2nd ed., 1988, Erlbaum; Hillsdale, NJ.
- Cooper Z. and Fairburn C.G., The evolution of “enhanced” cognitive behavior therapy for eating disorders: learning from treatment nonresponse, *Cognitive and Behavioral Practice* **18** (3), 2011, 394–402, <http://dx.doi.org/10.1016/j.cbpra.2010.07.007>.
- Dunlop D.D., Regression for longitudinal data - a bridge from least-squares regression, *The American Statistician* **48** (4), 1994, 299–303, <http://dx.doi.org/10.2307/2684838>.
- Elosua P., López-Jáuregui A. and Sánchez-Sánchez F., EDI-3, Inventario de Trastornos de la Conducta Alimentaria-3, Manual, 2010, Tea Ediciones; Madrid.
- Feingold A., Effect sizes for growth-modeling analysis for controlled clinical trials in the same metric as for classical analysis, *Psychological Methods* **14**, 2009, 43–53.
- Field A.E., Austin S.B., Taylor C.B., Malspeis S., Rosner B., Rockett H.R., ... Colditz G.A., Relation between dieting and weight change among preadolescents and adolescents, *Pediatrics* **112** (4), 2003, 900–906, <http://dx.doi.org/10.1542/peds.112.4.900>.
- Flay B.R., Biglan A., Boruch R.F., Castro F.G., Gottfredson D., Kellam S., ... Ji P., Standards of evidence: criteria for efficacy, effectiveness and dissemination, *Prevention Science* **6** (3), 2005, 151–175, <http://dx.doi.org/10.1007/s11121-005-5553-y>.
- Garner D.M., EDI-3, eating disorders inventory-3, professional manual, 2004, Psychological Assessment Resources; Florida, EEUU.
- Generalitat de Catalunya, *Idescat. El municipio en cifras. El Vallès Occidental* Vol. **40**, 2013, Retrieved from <http://www.idescat.cat/emex/?id=40=es#h40>.
- Glasgow R.E., Lichtenstein E. and Marcus A.C., Why don't we see more translation of health promotion research to practice? Rethinking the efficacy-to- effectiveness transition, *American Journal of Public Health* **93** (8), 2003, 1261–1267, <http://dx.doi.org/10.2105/AJPH.93.8.1261>.
- Government of Catalonia, Programa Salut i Escola, 2012, Departament de Salut i Departament d'Educació. [Health and School Program. Health Department and Education Department], Retrieved from <http://www.gencat.cat/educacio/butlleti/professors/noticies/salutiescola.htm>.
- Hanley J.A., Negassa A., Edwardes M.D.D. and Forrester J.E., Statistical analysis of correlated data using generalized estimating equations: an orientation, *American Journal of Epidemiology* **157** (4), 2003, 364–375, <http://dx.doi.org/10.1093/aje/kwf215>.
- Hansen W.B. and Dusenbury L., Building capacity for prevention's next generation, *Prevention Science* **2** (4), 2001, 207–208, <http://dx.doi.org/10.1023/A:1013636131280>.
- Ioannidis J.P.A., Haidich A.B., Pappa M., Pantazis N., Kokori S.I., Tektonidou M.G., ... Lau J., Comparison of evidence of treatment effects in randomized and nonrandomized studies, *Journal of the American Medical Association* **286** (7), 2001, 821–830, <http://dx.doi.org/10.1001/jama.286.7.821>.
- Kolko D.J. and Lindheim O., Introduction to the special series on booster sessions and long-term maintenance of treatment gains, *Journal of Abnormal Child Psychology* **42**, 2014, 339–342, <http://dx.doi.org/10.1007/s10802-013-9849-2>.
- Larson N.I., Neumark-Sztainer D. and Story M., Weight control behaviors and dietary intake among adolescents and young adults: longitudinal findings from Project EAT, *Journal of the American Dietetic Association* **109** (11), 2009, 1869–1877, <http://dx.doi.org/10.1016/j.jada.2009.08.016>.
- Levine M.P. and Smolak L., The prevention of eating problems and eating disorders: Theory, research, and practice, 2006, Lawrence Erlbaum Associates; Mahwah, NJ.
- Liang K.Y. and Zeger S.L., Longitudinal data-analysis using generalized linear-models, *Biometrika* **73** (1), 1986, 13–22, <http://dx.doi.org/10.1093/biomet/73.1.13>.



- López-Guimerà G., Fauquet J., Sánchez-Carracedo D., Barrada J.R., Saldaña C. and Masnou-Roig A., Psychometric properties of the perception of teasing scale in a Spanish adolescent sample: POTS-S, *Eating and Weight Disorders* **17** (3), 2012, e210–8, <http://dx.doi.org/10.3275/8245>.
- López-Guimerà G., Neumark-Sztainer D., Hannan P., Fauquet J., Loth K. and Sánchez-Carracedo D., Unhealthy weight-control behaviors, dieting and weight status: a cross-cultural comparison between North American and Spanish adolescents, *European Eating Disorders Review* **21**, 2013, 276–283, <http://dx.doi.org/10.1002/erv.2206>.
- López-Guimerà G., Sánchez-Carracedo D. and Fauquet J., Universal prevention programs on disordered eating: assessment methodologies, results and future lines, *Mexican Journal of Eating Disorders* **2**, 2011, 125–147.
- López-Guimerà G., Sánchez-Carracedo D., Fauquet J., Portell M. and Raich R.M., Impact of a school-based disordered eating prevention program in adolescent girls: general and specific effects depending on adherence to the interactive activities, *Spanish Journal of Psychology* **14** (1), 2011, 293–303, [http://dx.doi.org/10.5209/rev\\_SJOP.2011.v14.n1.26](http://dx.doi.org/10.5209/rev_SJOP.2011.v14.n1.26).
- Loth K., Wall M., Larson N. and Neumark-Sztainer D., Disordered eating and psychological well-being in overweight and nonoverweight adolescents: secular trends from 1999 to 2010, *International Journal of Eating Disorders* **48**, 2015, 323–327, <http://dx.doi.org/10.1002/eat.22382>.
- Maloney M.J., McGuire J.B. and Daniels S.R., Reliability testing of a childrens version of the eating attitude test, *Journal of the American Academy of Child and Adolescent Psychiatry* **27** (5), 1988, 541–543, <http://dx.doi.org/10.1097/00004583-198809000-00004>.
- Marchand E., Stice E., Rohde P. and Becker C.B., Moving from efficacy to effectiveness trials in prevention research, *Behaviour Research and Therapy* **49** (1), 2011, 32–41, <http://dx.doi.org/10.1016/j.brat.2010.10.008>.
- Martín-Albo J., Núñez J.L., Navarro J.G. and Grijalvo F., The rosenberg self-esteem scale: translation and validation in university students, *Spanish Journal of Psychology* **10**, 2007, 458–467.
- Morgan J.F., Reid F. and Lacey J.H., The SCOFF questionnaire: assessment of a new screening tool for eating disorders, *British Medical Journal* **319**, 1999, 1467–1468.
- Muro-Sans P., Amador-Campos J.A. and Morgan J.F., The SCOFF-c: psychometric properties of the Catalan version in a Spanish adolescent sample, *Journal of Psychosomatic Research* **64**, 2008, 81–86.
- Neumark-Sztainer D., Story M. and Coller T., Perceptions of secondary school staff toward the implementation of school-based activities to prevent weight-related disorders: a needs assessment, *American Journal of Health Promotion* **13** (3), 1999, 153–156, <http://dx.doi.org/10.4278/0890-1171-13.3.153>.
- Neumark-Sztainer D., Wall M., Guo J., Story M., Haines J. and Eisenberg M., Obesity, disordered eating, and eating disorders in a longitudinal study of adolescents: how do dieters fare 5 years later?, *Journal of the American Dietetic Association* **106** (4), 2006, 559–568, <http://dx.doi.org/10.1016/j.jada.2006.01.003>.
- O'Dea J.A., Developing positive approaches to nutrition education and the prevention of child and adolescent obesity: first, do not harm, In: O'Dea J.A. and Eriksen M., (Eds.), *Childhood obesity prevention. International research, controversies, and interventions*, 2010, Oxford University Press; New York, 31–41.
- Patton G.C., Selzer R., Coffey C., Carlin J.B. and Wolfe R., Onset of adolescent eating disorders: population based cohort study over 3 years, *British Medical Journal* **318** (7186), 1999, 765–768, <http://dx.doi.org/10.1136/bmj.318.7186.765>.
- ~~Priee J.H., Desmond S.M., Ruppert E.S. and Stelzer G.M., School nurses perceptions of childhood obesity, *Journal of School Health* **57** (8), 1987, 332–336.~~
- Raich R.M., Sánchez-Carracedo D. and López-Guimerà G., Alimentación, modelo estético femenino y medios de comunicación, *Cómo formar alumnos críticos en educación secundaria* Vol. 2a, 2008, Editorial Graó; Barcelona.
- Rawana J.S., Morgan A.S., Nguyen H. and Craig S.G., The relation between eating- and weight-related disturbances and depression in adolescence: a review, *Clinical Child and Family Psychology Review* **13** (3), 2010, 213–230, <http://dx.doi.org/10.1007/s10567-010-0072-1>.
- Rosenberg M., *Society and the adolescent self-image*, 1989, Wesleyan University Press; Middeltown, CT.
- Sánchez-Carracedo D., Efficacy of a school-based programme implemented by community agents in the prevention of eating and weight-related disorders, *Current Controlled Trials* 2011, <http://dx.doi.org/10.1186/ISRCTN47682626>.
- Sánchez-Carracedo D., Barrada J.R., López-Guimerà G., Fauquet J., Almenara C.A. and Trepal E., Analysis of the factor structure of the sociocultural attitudes towards appearance questionnaire (SATAQ-3) in Spanish secondary-school students through exploratory structural equation modeling, *Body Image* **9** (1), 2012, 163–171, <http://dx.doi.org/10.1016/j.bodyim.2011.10.002>.



- Sánchez-Carracedo D., López-Guimerà G., Fauquet J., Barrada J.R., Pàmias M., Puntí J., ... Trepal E., A school-based program implemented by community providers previously trained for the prevention of eating and weight-related problems in secondary-school adolescents: the MABIC study protocol, *BMC Public Health* **13**, 2013, 955, <http://dx.doi.org/10.1186/1471-2458-13-955>.
- Sánchez-Carracedo D., Neumark-Sztainer D. and López-Guimerà G., Integrated prevention of obesity and eating disorders: barriers, developments and opportunities, *Public Health Nutrition* 2012, 1–15, <http://dx.doi.org/10.1017/S1368980012000705>.
- Sancho C., Asorey O., Arija V. and Canals J., Psychometric characteristics of the children's eating attitudes test in a Spanish sample, *European Eating Disorders Review* **13** (5), 2005, 338–343, <http://dx.doi.org/10.1002/erv.643>.
- Sandin B., Escalas PANAS de afecto positivo y negativo para niños y adolescentes (PANASN), *Revista de Psicopatología y Psicología Clínica* **8**, 2003, 173–182.
- Schnicker K., Hiller W. and Legenbauer T., Drop-out and treatment outcome of outpatient cognitive-behavioral therapy for anorexia nervosa and bulimia nervosa, *Comprehensive Psychiatry* **54**, 2013, 812–823, <http://dx.doi.org/10.1016/j.comppsy.2013.02.007>.
- Shadish W.R., Clark M.H. and Steiner P.M., Can nonrandomized experiments yield accurate answers? A randomized experiment comparing random and nonrandom assignments, *Journal of the American Statistical Association* **103** (484), 2008, 1334–1343, <http://dx.doi.org/10.1198/01621450800000733>.
- Smolak L., Harris B., Levine M.P. and Shisslak C.M., Teachers: the forgotten influence on the success of prevention programs, *Eating Disorders* **9** (3), 2001, 261–265, <http://dx.doi.org/10.1080/10640260127553>.
- Stice E., Marti C.N., Spoor S., Presnell K. and Shaw H., Dissonance and healthy weight eating disorder prevention programs: long-term effects from a randomized efficacy trial, *Journal of Consulting and Clinical Psychology* **76** (2), 2008, 329–340, <http://dx.doi.org/10.1037/0022-006X.76.2.329>.
- Stice E., Rohde P., Gau J. and Shaw H., An effectiveness trial of a dissonance-based eating disorder prevention program for high-risk adolescent girls, *Journal of Consulting and Clinical Psychology* **77** (5), 2009, 825–834, <http://dx.doi.org/10.1037/a0016132>.
- Stice E., Shaw H., Becker C.B. and Rohde P., Dissonance-based interventions for the prevention of eating disorders: using persuasion principles to promote health, *Prevention Science* **9** (2), 2008, 114–128, <http://dx.doi.org/10.1007/s11121-008-0093-x>.
- Stice E., Shaw H. and Marti C.N., A meta-analytic review of eating disorder prevention programs: encouraging findings, *Annual Review of Clinical Psychology* **3**, 2007, 207–231, <http://dx.doi.org/10.1146/annurev.clinpsy.3.022806.091447>.
- Stice E., South K. and Shaw H., Future directions in etiologic, prevention, and treatment research for eating disorders, *Journal of Clinical Child and Adolescent Psychology* **41** (6), 2012, 845–855, <http://dx.doi.org/10.1080/15374416.2012.728156>.
- Thompson J.K., Cattarin J., Fowler B. and Fisher E., The perception of teasing scale (POTS) - a revision and extension of the physical appearance related teasing scale (PARTS), *Journal of Personality Assessment* **65** (1), 1995, 146–157, [http://dx.doi.org/10.1207/s15327752jpa6501\\_11](http://dx.doi.org/10.1207/s15327752jpa6501_11).
- Thompson J.K., van den Berg P., Roehrig M., Guarda A.S. and Heinberg L.J., The sociocultural attitudes towards appearance scale-3 (SATAQ-3): development and validation, *International Journal of Eating Disorders* **35** (3), 2004, 293–304, <http://dx.doi.org/10.1002/eat.10257>.
- Tolan P.H., Gorman-Smith D., Henry D. and Schoeny M., The benefits of booster interventions: evidence from a family-focused prevention program, *Prevention Science* **10**, 2009, 287–297, <http://dx.doi.org/10.1007/s11121-009-0139-8>.
- Treasure J., Claudino A.M. and Zucker N., Eating disorders, *Lancet* **375** (9714), 2010, 583–593, [http://dx.doi.org/10.1016/S0140-6736\(09\)61748-7](http://dx.doi.org/10.1016/S0140-6736(09)61748-7).
- Warschburger P., Helfert S. and Krentz E.M., POPS: a school-based prevention programme for eating disorders, *Journal of Public Health* **19**, 2011, 367–376, <http://dx.doi.org/10.1007/s10389-011-0425-3>.
- Watson D., Clark L.A. and Tellegen A., Development and validation of brief measures of positive and negative affect - the panas scales, *Journal of Personality and Social Psychology* **54**, 1988, 1063–1070.
- Wick C.K.B., Bormann B., Sowa M., Strauss B. and Berger U., Real-world effectiveness of a German school-based intervention for primary prevention of anorexia nervosa in preadolescent girls, *Preventive Medicine* **52** (2), 2011, 152–158, <http://dx.doi.org/10.1016/j.ypmed.2010.11.022>.
- Yager Z., Issues of teacher training in the prevention of eating disorders and childhood obesity in schools, In: O'Dea J.A. and Eriksen M., (Eds.), *Childhood Obesity Prevention. International research, controversies, and interventions*, 2010, Oxford

University Press; New York, 56–66.

Yager Z., Diedrichs P.C., Ricciardelli L.A. and Halliwell E., What works in secondary schools? A systematic review of classroom-based body image programs, *Body Image* **10** (3), 2013, 271–281, <http://dx.doi.org/10.1016/j.bodyim.2013.04.001>.

Yager Z. and O'Dea J.A., The role of teachers and other educators in the prevention of eating disorders and child obesity: what are the issues?, *Eating Disorders* **13** (3), 2005, 261–278, <http://dx.doi.org/10.1080/10640260590932878>.

Zeger S.L. and Liang K.Y., Longitudinal data-analysis for discrete and continuous outcomes, *Biometrics* **42** (1), 1986, 121–130, <http://dx.doi.org/10.2307/2531248>.

Zubrick S.R., Ward K.A., Silburn S.R., Lawrence D., Williams A.A., Blair E., ... Sanders M.R., Prevention of child behavior problems through universal implementation of a group behavioral family intervention, *Prevention Science* **6** (4), 2005, 287–304, <http://dx.doi.org/10.1007/s11121-005-0013-2>.

## Appendix A. Supplementary data

The following are the supplementary data related to this article:

[Multimedia Component 1](#)

[Multimedia Component 2](#)

[Multimedia Component 3](#)

[Multimedia Component 4](#)

---

### Highlights

- This is one of the few effectiveness trials in disordered eating prevention field.
- Community providers (deliverers) were trained in an integrated approach to prevention.
- Risk factors of disordered eating were assessed using widely used validated measures.
- *MABIC project* reduced risk factors at 1-year follow-up (no effects at post).
- Results support the transition from efficacy to effectiveness in this field.

---

## Queries and Answers

**Query:** Please check all the affiliations, and correct if necessary.

**Answer:** The following affiliation has been added to authors "Diego Palao" and "Montserrat Pàmias": <sup>9</sup>Dept. Psychiatry and Forensic Medicine, Universitat Autònoma de Barcelona, 08193, Bellaterra, Cerdanyola del Vallès, Barcelona, Spain. We have tried to insert a line break before "Corresponding author" but we could not. You should to edit the font.

**Query:** Please note that author's telephone/fax numbers are not published in Journal articles due to the fact that articles are available online and in print for many years, whereas telephone/fax numbers are changeable and therefore not reliable in the long term.

**Answer:** We understand it and agree.

**Query:** Please check the hierarchy of the section headings.

**Answer:** It is correct.

**Query:** This [opening/closing] parenthesis does not have a corresponding [closing/opening] parenthesis. Please insert the parenthesis in the appropriate position.

**Answer:** Corrected

**Query:** Uncited references: This section comprises references that occur in the reference list but not in the body of the text. Please cite each reference in the text or, alternatively, delete it. Any reference not dealt with will be retained in this section.

**Answer:** The reference has been deleted from References section.

**Query:** Please confirm that given names and surnames have been identified correctly.

**Answer:** Given names and surnames have been identified correctly

**Query:** Your article is registered as a regular item and is being processed for inclusion in a regular issue of the journal. If this is NOT correct and your article belongs to a Special Issue/Collection please contact v.s.agarwal@elsevier.com immediately prior to returning your corrections.

**Answer:** Our article is correctly registered as a regular item.