

Unhealthy Weight-control Behaviours, Dieting and Weight Status: A Cross-cultural Comparison between North American and Spanish Adolescents

Gemma López-Guimerà^{1*}, Dianne Neumark-Sztainer², Peter Hannan², Jordi Fauquet^{3,4}, Katie Loth² & David Sánchez-Carracedo¹

¹Dept. of Clinical and Health Psychology, Universitat Autònoma de Barcelona, Bellaterra (Cerdanyola del Vallès), Barcelona, Spain

²Division of Epidemiology and Community Health, School of Public Health, University of Minnesota, Minneapolis, MN, USA

³Dept. of Psychobiology and Methodology of Health Sciences, Universitat Autònoma de Barcelona, Bellaterra (Cerdanyola del Vallès), Barcelona, Spain

⁴Research Group in Neuroimage (GREEN), Fundació IMIM, Barcelona, Spain

Abstract

The aim of the current study was to examine and compare dieting and unhealthy weight-control behaviours (UWCB) in population-based samples in two large urban areas in Spain (Barcelona) and in the USA (Twin Cities of Minneapolis and St. Paul, Minnesota). Additionally, use of UWCB across weight categories was explored in both samples. Participants included 1501 adolescents from Barcelona (48% girls, 52% boys) and 2793 adolescents from the Twin Cities (53% girls, 47% boys). The main outcome measures were dieting, UWCB (less extreme and extreme) and weight status. Although dieting and UWCB were prevalent in both samples, particularly among girls, the prevalence was higher in the US sample. In both countries, the report of dieting and use of UWCB was highest among overweight and obese youth. Prevention interventions that address the broad spectrum of eating and weight-related problems should be warranted in light of the high prevalence and co-occurrence of overweight and unhealthy weight-related behaviours. Copyright © 2012 John Wiley & Sons, Ltd and Eating Disorders Association.

Keywords

adolescents; disordered eating; dieting; weight status; overweight

*Correspondence

Gemma López-Guimerà, PhD, Dept. of Clinical and Health Psychology, Edifici B, Campus de la Universitat Autònoma de Barcelona, 08193 Bellaterra (Cerdanyola del Vallès), Barcelona, Spain.

Email: gemma.lopez@uab.cat

Published online 11 October 2012 in Wiley Online Library (wileyonlinelibrary.com) DOI: 10.1002/erv.2206

Introduction

Dieting and unhealthy weight-control behaviours (UWCB) are prevalent among adolescents, particularly adolescent girls (Neumark-Sztainer & Hannan, 2000; Neumark-Sztainer, Story, Hannan, Perry, & Irving, 2002). Weight-control strategies commonly reported among adolescents range from healthy behaviours, such as increased fruit and vegetable intake, reduced consumption of sugar-sweetened beverages and moderate exercise, to unhealthy and potentially harmful behaviours, such as dieting, skipping meals and smoking, and to even more extreme behaviours such as purging and the use of laxatives or diet pills (Neumark-Sztainer, Wall, Haines, Story, Sherwood and van den Berg, 2007; Neumark-Sztainer, Flattum, Story, Feldman, & Petrich, 2008). Population-based studies conducted in the USA indicate that around 45% of adolescent girls and 20% of adolescents boys report dieting and UWCB, and between 10% and 15% of girls and 3% and 8% of boys report the use of extreme weight-control behaviours (Eaton et al., 2008; Linde, Wall, Haines, & Neumark-Sztainer, 2009; Neumark-Sztainer et al., 2002; Neumark-Sztainer et al., 2002; Neumark-Sztainer, Wall, Haines, Story, & Eisenberg, 2007; Pisetsky, Chao, Dierker, May, & Striegel-Moore, 2008; Zhang et al., 2011).

Furthermore, research conducted in the USA indicates that overweight adolescents are at even higher risk for engaging in these behaviours, with between 60% and 70% of girls and 40% and 60% of boys who are overweight and obese reporting dieting or the use of other UWCB (Neumark-Sztainer & Hannan, 2000; Neumark-Sztainer et al., 2002; Neumark-Sztainer et al., 2007).

The high prevalence of these behaviours is cause for concern, given that results from a broad range of studies indicate that dieting and UWCB are associated with less healthy dietary patterns and may have a negative effect on both physical and psychosocial health (Crow, Eisenberg, Story, & Neumark-Sztainer, 2006; French & Jeffery, 1994; Goldschmidt et al., 2008; Guest et al., 2010; Kelly, Molcho, & Gabhainn, 2010; Larson, Neumark-Sztainer, & Story, 2009; Neumark-Sztainer, Hannan, Story, & Perry, 2004; Neumark-Sztainer, Story, Beth, Resnick, & Blum, 1997; Rawana, Morgan, Nguyen, & Craig, 2010; Santos, Richards, & Bleckley, 2007; Stice & Bearman, 2001; Tomiyama et al., 2010; Turner et al., 2001). In addition, longitudinal studies indicate that engaging in unhealthy and extreme weight-control behaviours increases risk for weight gain, overweight status, disordered eating behaviours and the development of clinical eating disorders (Field et al., 2003; Neumark-Sztainer et al., 2006; Neumark-Sztainer

et al., 2007; Neumark-Sztainer, Wall, Story, & Sherwood, 2009; Patton et al., 1997; Patton, Selzer, Coffey, Carlin, & Wolfe, 1999; Stice, Cameron, Killen, Hayward, & Taylor, 1999; Stice, Presnell, Shaw, & Rohde, 2005). In this line, a recent 10-year longitudinal study indicated that among overweight adolescent girls, those who used UWCB at both time 1 and time 2 (10 years later) increased their BMI by 5.19 units as compared with an increase of only 0.15 BMI units among overweight adolescent girls who did not use any UWCB (Neumark-Sztainer, Wall, Story, & Standish, 2012).

Despite adequate empirical evidence regarding the high prevalence of dieting and UWCB, particularly in overweight adolescents, and their associated negative physical and psychological outcomes, most obesity prevention interventions have historically neither assessed nor aimed to reduce the use of such behaviours. Instead, the goal of reducing the use of unhealthy and extreme weight-control behaviours is often exclusively imbedded into programmes aimed at eating disorder prevention (Sánchez-Carracedo, Neumark-Sztainer, & López-Guimerà, In Press). More recently, researchers in both fields have begun to recognize the importance of working together, particularly in the area of prevention via an integrated approach (Austin, Field, Wiecha, Peterson, & Gortmaker, 2005; Haines, Neumark-Sztainer, Perry, Hannan, & Levine, 2006; Lopez-Guimera & Sanchez-Carracedo, 2010; Neumark-Sztainer, 2005; Neumark-Sztainer, 2007; Neumark-Sztainer, 2009; O'Dea, 2005; Shaw, Ng, & Stice, 2007; Stock et al., 2007; Sánchez-Carracedo et al., In Press). One of the most important reasons for utilizing an integrated preventive approach is that both obesity and eating disorders share a number of important risk factors, including dieting and UWCB (BodyWise and BodyWorks, 2005; Day, Ternouth, & Collier, 2009; Haines & Neumark-Sztainer, 2006; Hill, 2007; Neumark-Sztainer et al., 2006; Neumark-Sztainer, Wall, Haines, Story, Sherwood and van den Berg, 2007).

The majority of the studies examining shared risk factors have been conducted in North American populations; this fact limits the generalizability of their results to adolescents from other countries. On one hand, European countries share a number of important socio-cultural factors related to eating and weight with the USA including the following: media exposure to images of thin and unrealistic ideals of beauty, unhealthy messages regarding how to attain this thin ideal and misinformation about food and weight control (Lopez-Guimera, Levine, Sanchez-Carracedo, & Fauquet, 2010). On the other hand, the US and European countries are different cultures with different languages, traditions and eating patterns. Hence, in order to explore the appropriateness of using an integrated approach to the prevention of eating disorders and obesity in European countries, it is necessary to first assess the prevalence of dieting and UWCB and their relationship to weight status among European adolescents. In Europe, the percentage of overweight in children and adolescents is estimated to be about 20% (Branca, Nikogosian, & Lobstein, 2007). Spain is a particularly interesting European country to study because the prevalence of obesity among children is the highest in European countries (Lobstein, Baur, Uauy, & IASO International Obesity Task Force, 2004; OCDE, 2012; Serra-Majem, Aranceta Bartrina, Perez-Rodrigo, Ribas-Barba, & Delgado-Rubio, 2006); Spain includes the culture of the Mediterranean diet, which is widely viewed as one of the healthiest diets (Trichopoulou, Costacou, Bamia, & Trichopoulos, 2003; van den Brandt, 2011); and little research has been conducted

that might capture the intersection between risk factors for both obesity and eating disorders. Few studies in Spain have examined the prevalence of dieting by weight status in adolescents (López-Guimerà, Fauquet, Portell, Sánchez-Carracedo, & Raich, 2008; Sánchez-Carracedo, Saldaña, & Doménech, 1996; Sánchez-Carracedo & Saldaña, 1998). The results of these studies indicate that between 14% and 24% of adolescent girls and around 5% of adolescent boys report dieting, with overweight adolescents more likely to diet than their normal-weight peers. None of the studies conducted in Spain examined the prevalence of other unhealthy or extreme weight-control behaviours by weight status, which is an essential next step toward understanding if an integrated prevention approach is also appropriate within this country.

Therefore, the aims of the present study are the following: (1) to examine and compare dieting and UWCB in population-based samples in two large urban areas in Spain (Barcelona) and in the USA [Minneapolis/St. Paul Twin Cities (TC)] and (2) to examine and compare UWCB as a function of weight status in both samples. To our knowledge, this is the first cross-cultural study between Spanish and North American adolescents that assesses the prevalence of dieting and unhealthy and extreme weight-control behaviours and their relationship to weight status.

Methods

Participants

The Spanish sample consisted of 1501 adolescents (52% male) recruited from five schools (two public and three grant-aided private schools) in Barcelona and Sabadell cities (BCN) to participate in the MABIC project (*Medios de comunicación; Alimentación; Burlas relacionadas con el peso and Insatisfacción Corporal*), a research project on the prevention of eating and weight-related problems. At the time of recruitment, participants were enrolled in the Mandatory Secondary Education years of the Spanish system (7th to 10th grades in the USA), and the mean participant age was 14.3 years ($SD = 1.2$). Participants were roughly equally distributed across grades. The racial/ethnic background of participants was as follows: 83.4% Spanish, 7.2% Latin-American, 2.3% from other European countries, 1.0% African (0.9% from North Africa and 0.1% from Sub-Saharan Africa) and 6.1% of mixed or unknown origin.

The US sample consisted of 2793 adolescents (47% male) recruited from 20 public middle and high schools in the TC metropolitan area of Minnesota to participate in Eating and Activity in Teens 2010 (EAT), a multi-level study aimed at identifying factors associated with weight-related problems in adolescents. The mean age of the study population was 14.4 years ($SD = 2.0$); 46.1% were in middle school (6th–8th grades), and 53.9% were in high school (9th–12th grades). The racial/ethnic background of the participants was as follows: 18.9% White, 20.0% African-American or Black, 19.9% Asian-American, 16.9% Hispanic, 3.7% Native American, and 11.6% mixed or other.

Additional studies utilizing these study samples have been published elsewhere (Berge, Wall, Larson, Loth, & Neumark-Sztainer, In press; Eisenberg, Wall, & Neumark-Sztainer, In press; Haines, Hannan, van den Berg, Eisenberg, & Neumark-Sztainer, In press; López-Guimerà et al., In press; Neumark-Sztainer et al., 2012; Sánchez-Carracedo et al., 2012; Wall et al., 2012).

Procedures

Data were collected from the Spanish sample from February to May 2009 and from the US sample from September 2009 to May 2010. In both studies, trained research staff administered surveys and measured adolescents' height and weight during regular classes. Measurements were completed in a private area near the area of survey administration. The Spanish study was approved by the Clinical Research Ethics Committee of the 'Parc Taulí' Health Corporation in Sabadell (Barcelona, Spain, Study Number: 2009-512), and the North American study procedures were approved by the University of Minnesota's Institutional Review Board Human Subjects Committee (IRB Study Number: 0508S72388) and by the research boards of the two participating school districts. Both Spanish and North American adolescents were given the opportunity to assent only if their parent/guardian did not return an assigned consent form, indicating their refusal to have their child participate.

Measures

Identical measures were used in the Spanish and US samples to assess variables used in the current analysis. Questions were drawn from earlier waves of the Project EAT study (Neumark-Sztainer, Wall, Haines, Story, Sherwood and van den Berg, 2007). The translation had been carried out by two highly qualified and independent translators, and the final Spanish version was revised and agreed upon by experts in adolescent health and eating and weight-related disorders, following the international guidelines for translating and adapting tests (Hambleton, Merenda, & Spielberg, 2005; International Test Commission, 2010).

Dieting

Dieting was assessed with the question: 'How often have you gone on a diet during the last year? By "diet" we mean changing the way you eat so you can lose weight.' Responses included: never, one to four times, five to 10 times, more than 10 times, and I am always dieting. To distinguish dieters from non-dieters, responses were dichotomized into no (never) and yes (other responses). The term 'dieting' can include different types of weight-control behaviours. The association of weight-control behaviours with negative effect on both physical and psychosocial health has been established in many studies using this general term. In order to compare our research with previous findings, we have decided to maintain the assessment of this variable.

Unhealthy weight-control behaviours

Specific types of UWCB were assessed with the following question: 'Have you done any of the following things in order to lose weight or keep from gaining weight during the past year? (yes or no for each method).' Behaviours categorized as less extreme UWCB included (1) fasted, (2) ate very little food, (3) used a food substitute (e.g. Slim-fast), (4) skipped meals and (5) smoked more cigarettes; and behaviours categorized as extreme UWCB included (6) took diet pills, (7) made myself vomit, (8) used laxatives and (9) used diuretics. Percentages of respondents using at least one of the behaviours within the two categories of less extreme or extreme UWCB were calculated. The assessment of UWCB allows us to evaluate more specifically the term 'dieting'.

Body mass index and weight status

In both countries, weight status was based on height and weight measurements taken by trained research staff in a private area near the area of survey administration. Standardized equipment and procedures were employed. BMI was calculated as kilogram per square meter. Weight status was established using gender-specific and age-specific cut-off points based on reference data from international criteria proposed by Cole, Bellizzi, Flegal, and Dietz (2000) and Cole, Flegal, Nicholls, and Jackson (2007). Participants were classified to four categories of weight status (underweight, normal weight, overweight and obesity) following International Obesity Task Force criteria.

Statistical analysis

Because the age distributions were different in the two samples, weights were calculated to make each sample look like the pooled (marginal) age distribution in cells of gender and integral year of age. Weights totalled to the respective sample sizes. These weights were used in all analyses. For the genders and sample locations separately, descriptive prevalences were generated for each behavioural outcome.

Within strata of gender, for the summary weight-control behaviours of dieting, any less extreme UWCB and any extreme UWCB, predicted rates by weight status and sample location were generated in a generalized linear model using the log-link and binomial distribution. The model (weighted and with continuous age as a covariate) included the categorical weight status, sample location and their interaction. Within each category of weight status, prevalence ratios (PR) comparing the proportion of reporting a behaviour in BCN versus that in TC were generated by exponentiating the corresponding statistical contrast. Also obtained were the sample-specific linear trends (on the log-scale) across the four categories of weight status, which were then exponentiated to give the multiplicative trend. Test *p*-values for these trends and for the between-sample differences in trends were obtained on the log-scale estimates.

Results

Weight status, dieting and unhealthy weight-control behaviours in Barcelona and the Twin Cities

For both girls and boys, mean BMI values were approximately three units higher in the TC sample than the BCN sample (Table 1). The combined percentages of overweight and obesity were 16.4% (girls) and 14.7% (boys) in BCN compared with higher values of 39.6% (girls) and 43.4% (boys) in TC.

In both girls and boys, dieting was less prevalent in the BCN sample than in the TC sample (Table 2). The use of specific less extreme UWCB were generally less prevalent among girls in the BCN sample as compared with girls in TC; associations were statistically significant for 'eat very little food' and 'skipped meals' (both $p < 0.001$). Patterns were similar for boys, although more of the associations were statistically significant, with boys in BCN tending to engage in fewer less extreme weight-control behaviours than boys in the TC sample. With respect to extreme UWCB, diet pill use among girls was slightly lower in the BCN sample (1.1%) than in the TC sample (2.6%, $p = 0.032$), whereas all other

Table 1 Characteristics of adolescent samples from Barcelona and the Twin Cities by gender

	BCN (N= 1501)				TC (N= 2525)			
	Girls		Boys		Girls		Boys	
	n	%	n	%	n	%	n	%
Gender	724	48.2	777	51.8	1362	53.9	1163	46.1
Weight status								
Underweight	52	7.2	75	9.8	7	0.5	16	1.3
Normal weight	548	76.3	579	75.6	816	59.9	642	55.2
Overweight	103	14.3	97	12.7	304	22.3	262	22.5
Obesity	15	2.1	15	2.0	235	17.3	243	20.9
Mean age, years (SD)	14.3 (1.2)		14.4 (1.2)		14.7 (1.6)		14.8 (1.7)	
Mean BMI (SD)	20.2 (3.0)		20.3 (3.2)		23.8 (5.7)		23.7 (5.7)	

Note:

BCN, Barcelona; TC, Twin Cities; SD, standard deviation; BMI, body mass index.

Table 2 Comparisons of percents reporting dieting and unhealthy weight-control behaviours among girls and boys in Barcelona and the Twin Cities

	Girls				p-value	Boys				
	BCN (N= 724)*		TC (N= 1362)*			BCN (N= 777)*		TC (N= 1163)*		
	n	%	n	%		n	%	n	%	
General, over past year										
Dieting	245	33.9	622	45.7	<0.001	110	14.2	363	31.3	<0.001
Less extreme UWCB										
Fasted	61	8.5	182	13.5	0.051	24	3.1	140	12.2	<0.001
Used food substitute	55	7.7	101	7.6	0.837	28	3.6	77	6.8	0.001
Smoke more cigarettes	19	2.6	26	1.9	0.092	8	1.0	29	2.5	0.069
Eat very little food	137	19.0	527	38.8	<0.001	46	5.9	300	25.9	<0.001
Skipped meals	105	14.6	496	36.6	<0.001	34	4.4	269	23.3	<0.001
Any less extreme UWCB	200	27.9	658	48.9	<0.001	92	12.0	434	38.0	<0.001
Extreme UWCB										
Laxatives	16	0.7	16	1.2	0.227	2	0.3	15	1.3	0.037
Diuretics	17	1.8	17	1.3	0.125	2	0.3	15	1.3	0.033
Vomit	45	2.8	45	3.3	0.505	2	0.3	17	1.5	0.021
Diet pills	35	1.1	35	2.6	0.032	1	0.1	14	1.2	0.072
Any extreme UWCB	42	5.8	85	6.3	0.630	7	0.8	42	3.6	<0.001

Note:

UWCB, unhealthy weight-control behaviours; BCN, Barcelona; TC, Twin Cities.

*Numbers for the denominators down columns may show small incidental missingness.

behaviours were similar in the two samples (Table 2). In boys, for specific extreme UWCB, prevalences were very low in both samples, with a few differences in some items. However, these findings should be treated with caution because of the low number of boys who reported these behaviours, especially in the BCN sample (Table 2).

Finally, percentages of youth using any less extreme or extreme UWCB were compared across the samples; prevalences were consistently lower in the BCN sample than in the TC sample. Among adolescent girls, 27.9% of the BCN sample and 48.9% of the TC sample reported use of any less extreme UWCB ($p < 0.001$). Among adolescent boys, these corresponding percentages were 12.0% for BCN and 38.0% for TC ($p < 0.001$). With regard to extreme UWCB, in girls the prevalences in BCN and TC were statistically indistinguishable, whereas in boys differences

in prevalences in BCN (0.8%) and in TC (3.6%) were statistically significant ($p < 0.001$) despite low numbers (Table 2).

Comparison of dieting and unhealthy weight-control behaviours within weight-status categories in Barcelona and the Twin Cities

Among adolescent girls (Table 3), the prevalences of dieting are notably similar between BCN and TC within weight-status categories, and both samples showed higher prevalences of dieting at higher levels of weight status. However, the stronger multiplicative trend in BCN (2.17) was not statistically different from that in TC (1.65, $p = 0.334$). The trend across weight categories is estimated and tested on the log-scale, but roughly, for example in the TC sample, the ratio comparing dieting prevalence in the obese with that in the underweight is $76.9/18.2 = 4.23 = 1.62^3$

Table 3 Age-adjusted prevalence in the report of use of dieting and unhealthy weight-control behaviours and comparison between Barcelona and the Twin Cities by weight status in girls

	Dieting				Any less extreme UWCB				Any extreme UWCB			
	BCN (%)	TC (%)	PR	<i>p</i>	BCN (%)	TC (%)	PR	<i>p</i>	BCN (%)	TC (%)	PR	<i>p</i>
Weight status												
Underweight	7.8	18.1	2.3	0.369	9.4	18.1	1.9	0.477	1.7	0.0	–	–
Normal weight	30.2	31.5	1.0	0.636	24.6	38.1	1.6	<0.001	4.1	3.9	0.9	0.809
Overweight	58.7	60.7	1.0	0.711	47.5	59.1	1.3	0.031	13.8	7.2	0.5	0.035
Obesity	82.6	76.9	0.9	0.606	50.1	74.1	1.5	0.142	13.0	14.1	1.1	0.905
Trend*	2.17	1.65			1.76	1.60			2.09	1.91		
<i>p</i> -value [†]	<0.001	0.041			<0.001	0.056			0.047	<0.001		
Ratio of trends, <i>R</i> [‡]	0.76				0.91				0.91			
<i>p</i> -value for <i>R</i> [§]	0.334				0.730				0.814			

Note:

UWCB, unhealthy weight-control behaviours; BCN, Barcelona; TC, Twin Cities; PR, prevalence ratio within each category of weight status; *p*, *p*-value for prevalence ratio. *Trend across the four categories of weight status within each country is estimated as the exponentiated linear trend on the log-scale. Trend is across only three categories for any extreme UWCB in TC.

[†]*p*-value tests the trend against no-trend (flat response) on the log-scale, within each country.

[‡]Ratio of trends: ratio of the trend estimated for TC versus BCN.

[§]*p*-value for *R*: tests whether this ratio differs from 1.

(because of the three steps between categories). With regard to less extreme UWCB, for all categories of weight status, the BCN sample showed lower prevalences than those in the TC sample; however, comparison of trends between BCN and TC was not statistically significant ($p=0.730$). Finally, differences across countries in the prevalences of extreme UWCB were statistically significant only in the overweight group (13.8% in BCN and 7.2% in TC, $p=0.035$). The increases in prevalences across weight-status categories were statistically indistinguishable between the two samples ($p=0.814$).

Among boys (see Table 4), the prevalence of dieting was lower in the BCN than in the TC sample at normal weight (8.4% in BCN vs 15.4% in TC, $p<0.001$); levels of dieting did not differ statistically across countries for other categories of weight status. Both samples showed higher levels of dieting prevalence across categories of weight status, the multiplicative trend of 3 in BCN being statistically higher than the 2 in TC ($p=0.034$). For less extreme UWCB, for all groups of weight status except obesity, the BCN sample showed prevalences considerably lower than those in the TC sample. The multiplicative trend was much

Table 4 Age-adjusted prevalence in the report of dieting and unhealthy weight-control behaviours and comparison between Barcelona and the Twin Cities by weight status in boys

	Dieting				Any less extreme UWCB				Any extreme UWCB			
	BCN (%)	TC (%)	PR	<i>p</i>	BCN (%)	TC (%)	PR	<i>p</i>	BCN (%)	TC (%)	PR	<i>p</i>
Weight status												
Underweight	3.5	0.0	–	–	3.9	26.7	6.9	0.007	0.0	0.0	–	–
Normal weight	8.4	15.4	1.8	<0.001	8.5	22.8	2.7	<0.001	0.8	3.0	3.7	0.011
Overweight	49.6	43.9	0.9	0.302	27.5	53.3	1.9	<0.001	1.9	2.4	1.3	0.739
Obesity	75.6	61.3	0.8	0.109	68.1	61.6	0.9	0.550	0.0	7.0	–	–
Trend*	3.01	2.00			2.66	1.40			2.34	1.54		
<i>p</i> -value [†]	<0.001	<0.001			<0.001	0.007			0.315	0.009		
Ratio of trends, <i>R</i> [‡]	0.66				0.53				0.66			
<i>p</i> -value for <i>R</i> [§]	0.034				0.004				0.626			

Note:

UWCB, unhealthy weight-control behaviours; BCN, Barcelona; TC, Twin Cities; PR, prevalence ratio within each category of weight status; *p*, *p*-value for prevalence ratio. *Trend across the four categories of weight status within each country is estimated as the exponentiated linear trend on the log-scale. Trend is across only three categories for any extreme UWCB in TC.

[†]*p*-value tests the trend against no-trend (flat response) on the log-scale, within each country.

[‡]Ratio of trends: ratio of the trend estimated for TC versus BCN.

[§]*p*-value for *R*: tests whether this ratio differs from 1.

stronger in BCN than in TC ($p = 0.004$). Finally, the comparisons of prevalences of extreme UWCB must be interpreted with caution because of the very small number of boys from BCN who use extreme behaviours. In these sparse data, a statistically significant result was obtained only with the normal-weight group, with lower prevalences of extreme behaviours in BCN as compared with TC (PR = 3.7, $p < 0.011$), but the trend within the TC sample was statistically significant ($p = 0.009$).

Discussion

The aims of the current study were to examine and compare dieting and UWCB in population-based samples in two large urban areas, Spain (BCN) and the USA (TC), and to explore UWCB as a function of weight status in both samples. This is the first cross-cultural study between Spanish and North American adolescent samples of these characteristics. In general, we found high prevalences of these behaviours in both samples, particularly among girls, although prevalences tended to be higher in the US sample than in the Spanish sample. In general, youth from both countries at higher levels of weight status were at greater risk for the use of UWCB. These findings point to a need for interventions aimed at the prevention of UWCB for youth from both cultures. Furthermore, these findings provide initial support for the incorporation of messages aimed at preventing UWCB within obesity prevention interventions in Spain, as has already been proposed for prevention efforts within the USA (Neumark-Sztainer, 2005; Neumark-Sztainer, 2007; Neumark-Sztainer, 2009; Neumark-Sztainer, 2009).

Although significantly more girls within the USA reported dieting and the use of UWCB as compared with girls in Spain, the prevalence was high and of concern in both countries (e.g. 46% of girls from the TC sample and 34% of girls in the BCN sample self-reported dieting). These percentages are similar to those found in other studies conducted with North American samples (Eaton *et al.*, 2008; Linde, Wall, Haines, & Neumark-Sztainer, 2009; Pisetsky *et al.*, 2008; Zhang *et al.*, 2011) and higher than previous studies conducted with Spanish samples (López-Guimerà *et al.*, 2008; Sánchez-Carracedo *et al.*, 1996; Sánchez-Carracedo & Saldaña, 1998), possibly because of differences in questions that assessed dieting. The prevalence of girls using at least one extreme UWCB was similar in both samples, at approximately 6%. This percentage is consistent with the prevalence for all eating disorders (including anorexia nervosa, bulimia nervosa and eating disorders not otherwise specified) in both countries, which is estimated at nearly 6% in the USA (Hudson, Hiripi, Pope, & Kessler, 2007) and 4–6% in Spanish girls and young women aged 12 to 21 years (Grupo de Trabajo de la Guía de Práctica Clínica sobre Trastornos de la Conducta Alimentaria [Task force of the Clinical Practice Guideline on Eating Disorders], 2009).

A significant difference in the prevalence of dieting and the use of UWCB was seen among boys from the two countries. One particularly notable result is that almost 40% of boys from the TC sample reported using at least one UWCB categorized as less extreme in the last year compared with 12% of boys from BCN. A significant difference was also found in the greater prevalence of North American boys who reported using any extreme UWCB as compared with Spanish boys. In sum, the results suggest that interventions designed to reduce the prevalence of dieting and

UWCB are required in both countries. Although the prevalence of UWCB is still very low in Spanish adolescent boys, appropriate intervention may help to keep this prevalence low and not rise to the levels seen for boys in the USA.

In both the BCN and TC samples, overweight and obese girls were significantly more likely to report dieting and UWCB than non-overweight girls, although these behaviours were still prevalent among non-overweight girls. The comparison between the two trends in both samples was not statistically significant, indicating that associations between weight status and use of UWCB were similar in both countries. Overweight and obese boys were also significantly more likely to report dieting and UWCB than non-overweight boys in both samples. These findings provide initial support for the incorporation of messages aimed at preventing UWCB within obesity prevention interventions in Spain as has already been proposed for prevention efforts within the USA (Neumark-Sztainer, 2005; Neumark-Sztainer, 2007; Neumark-Sztainer, 2009; Neumark-Sztainer, 2009). Recently, there have been a number of interesting initiatives in Spain that have utilized an environmental approach to prevent obesity (PERSEO Program and THAO Program). However, as far as we know, little or no attention has been directed toward UWCB, body image, excessive weight concerns and other variables relevant to an integrated approach to prevention, in either the intervention or the assessment protocols (Sánchez-Carracedo *et al.*, In press).

In general, although overweight adolescents are more likely than their non-overweight peers to report dieting and UWCB, these behaviours are also prevalent in non-overweight youth (Crow *et al.*, 2006; Kelly *et al.*, 2010; Kim & Kim, 2005; López-Guimerà *et al.*, 2008; Neumark-Sztainer & Hannan, 2000; Neumark-Sztainer *et al.*, 2002). Therefore, it is important that youth of all weight groups be included in efforts aimed at preventing the use of unhealthy behaviours to control or lose weight.

The current study had a number of strengths that enhance our ability to draw conclusions from the findings. First, the population-based nature of both samples allows for more generalizability than would be possible from clinic-based samples. Second, survey items utilized in the current study were identical (except for translation) as they were drawn from previous Project EAT surveys. Third, in both samples, height and weight were measured *in situ* in comparison with many large population-based studies of youth that rely on self-reported height and weight data. Finally, to the best of our knowledge, this is the first cross-cultural study between Spanish and North American adolescent samples that assesses the prevalence of dieting and UWCB and their relationship to weight status. Study limitations should also be taken into account in interpreting the findings. The main study limitation is that neither sample is nationally representative; thus, extrapolations to the larger Spanish and US populations should be made carefully. However, our study findings are consistent with previous studies conducted in different countries around the world, which found that overweight youth are more likely to engage in dieting and UWCB than their non-overweight peers (Al Sabbah *et al.*, 2010; Domine, Berchtold, Akre, Michaud, & Suris, 2009; Fonseca, Matos, Guerra, & Pedro, 2009; López-Guimerà *et al.*, 2008; McCabe & Ricciardelli, 2009; Stigler *et al.*, 2011; Sánchez-Carracedo *et al.*, 1996; Zhang *et al.*, 2011). Additionally, although height and weight were measured by trained research staff,

weight-control behaviours were assessed via self-report, which is appropriate for studies of large samples, but may be subject to response bias. Finally, the cross-sectional design of the study does not allow for an assessment of temporality of relationships between weight-control behaviours and weight status.

The results of the current study indicate a high prevalence of dieting and UWCB among youth in both countries, particularly in girls and in overweight and obese adolescents. Dieting and UWCB have been found to be ineffective for long-term weight management and are associated with weight gain and increased risk for extreme UWCB and eating disorders (Neumark-Sztainer et al., 2006; Neumark-Sztainer, Wall, Haines, Story, Sherwood and van den Berg, 2007; Neumark-Sztainer et al., 2008). Therefore, in both cultures integrated interventions aiming at prevention of both eating disorders and obesity are needed (Sánchez-Carracedo et al., In press). Interventions should promote the adoption of life-long healthy eating and physical activity behaviours such as eating a healthy breakfast every morning, eating more fruits and vegetables, drinking water instead of sweetened beverages and spending fewer hours in front of

the television (Neumark-Sztainer, 2007; Neumark-Sztainer, 2009; Neumark-Sztainer, 2009; Neumark-Sztainer et al., 2008). Further research is needed to explore more specifically what factors could explain the differences and similarities between both countries. This information will allow designing these interventions with common and specific components for each country.

Acknowledgements

This study was supported by Grant Number PSI2009-08956 (David Sánchez-Carracedo, principal investigator) from the Ministry of Science & Innovation of the Spanish Government and by Grant Number R01HL084064 (D. Neumark-Sztainer, principal investigator) from the National Heart, Lung, and Blood Institute. The content is solely the responsibility of the authors and does not necessarily represent the official views of the Ministry of Science & Innovation, the National Heart, Lung, and Blood Institute or the National Institutes of Health.

REFERENCES

- Al Sabbah, H., Vereecken, C., Abdeen, Z., Kelly, C., Ojala, K., Nemeth, A., et al. (2010). Weight control behaviors among overweight, normal weight and underweight adolescents in Palestine: Findings from the national study of Palestinian schoolchildren (HBSC-WBG2004). *International Journal of Eating Disorders*, 43(4), 326–336. DOI:10.1002/eat.20698
- Austin, S. B., Field, A. E., Wiecha, J., Peterson, K. E., & Gortmaker, S. L. (2005). The impact of a school-based obesity prevention trial on disordered weight-control behaviors in early adolescent girls. *Archives of Pediatrics & Adolescent Medicine*, 159(3), 225–230.
- Berge, J. M., Wall, M., Larson, N., Loth, K. A., & Neumark-Sztainer, D. (In Press). Family functioning: Associations with weight status, eating behaviors, and physical activity in adolescents. *Journal of Adolescent Health*.
- BodyWise and BodyWorks. (2005). Eating disorders and obesity: How are they related? U.S. Department of Health and Human Services Office on Women's Health. Retrieved June/17, 2010, from <http://www.4woman.gov/bodyimage/kids/bodyworks/CompanionPiece.pdf>
- Branca, F., Nikogosian, H., & Lobstein, T. (2007). The challenge of obesity in the WHO European region and the strategies for response. Copenhagen: WHO Regional Office for Europe.
- van den Brandt, P. A. (2011). The impact of a Mediterranean diet and healthy lifestyle on premature mortality in men and women. *American Journal of Clinical Nutrition*, 94(3), 913–920. DOI: 10.3945/ajcn.110.008250
- Cole, T. J., Bellizzi, M. C., Flegal, K. M., & Dietz, W. H. (2000). Establishing a standard definition for child overweight and obesity worldwide: International survey. *British Medical Journal*, 320(7244), 1240–1243.
- Cole, T. J., Flegal, K. M., Nicholls, D., & Jackson, A. A. (2007). Body mass index cut offs to define thinness in children and adolescents: International survey. *British Medical Journal*, 335(7612), 194–197. DOI: 10.1136/bmj.39238.399444.55 ER
- Crow, S., Eisenberg, M. E., Story, M., & Neumark-Sztainer, D. (2006). Psychosocial and behavioral correlates of dieting among overweight and non-overweight adolescents. *Journal of Adolescent Health*, 38(5), 569–574. DOI: 10.1016/j.jadohealth.2005.05.019
- Day, J., Ternouth, A., & Collier, D. A. (2009). Eating disorders and obesity: Two sides of the same coin? *Epidemiologia e Psichiatria Sociale*, 18(2), 96–100.
- Domine, F., Berchtold, A., Akre, C., Michaud, P., & Suris, J. (2009). Disordered eating behaviors: What about boys? *Journal of Adolescent Health*, 44(2), 111–117. DOI: 10.1016/j.jadohealth.2008.07.019
- Eaton, D. K., Kann, L., Kinchen, S., Shanklin, S., Ross, J., Hawkins, J., et al. (2008). Youth risk behavior surveillance—United States, 2007. *Morbidity and Mortality Weekly Report*, 57(SS4), 1–131.
- Eisenberg, M. E., Wall, M., & Neumark-Sztainer, D. (In Press). Muscle enhancing behaviors among adolescent girls and boys. *Pediatrics*.
- Field, A. E., Austin, S. B., Taylor, C. B., Malspeis, S., Rosner, B., Rockett, H. R., et al. (2003). Relation between dieting and weight change among preadolescents and adolescents. *Pediatrics*, 112(4), 900–906.
- Fonseca, H., Matos, M. G., Guerra, A., & Pedro, J. G. (2009). Are overweight and obese adolescents different from their peers? *International Journal of Pediatric Obesity*, 4(3), 166–174. DOI: 10.1080/17477160802464495
- French, S. A., & Jeffery, R. W. (1994). Consequences of dieting to lose weight—effects on physical and mental health. *Health Psychology*, 13(3), 195–212. DOI: 10.1037/0278-6133.13.3.195
- Goldschmidt, A. B., Jones, M., Manwaring, J. L., Luce, K. H., Osborne, M. I., Cunniff, D., et al. (2008). The clinical significance of loss of control over eating in overweight adolescents. *International Journal of Eating Disorders*, 41(2), 153–158. DOI: 10.1002/eat.20481
- Grupo de Trabajo de la Guía de Práctica Clínica sobre Trastornos de la Conducta Alimentaria [Task force of the Clinical Practice Guideline on Eating Disorders] (2009). Guía de práctica clínica sobre trastornos de la conducta alimentaria [clinical practice guideline on eating disorders]. (No. Guía de práctica clínica [Clinical Guideline]: AATR M. Núm. 2006/05-01). Madrid: Spain.
- Guest, J., Bilgin, A., Pearce, R., Baines, S., Zeuschner, C., Le Rossignol-Grant, C., et al. (2010). Evidence for under-nutrition in adolescent females using routine dieting practices. *Asia Pacific Journal of Clinical Nutrition*, 19(4), 526–533.
- Haines, J., & Neumark-Sztainer, D. (2006). Prevention of obesity and eating disorders: A consideration of shared risk factors. *Health Education Research*, 21(6), 770–782. DOI: 10.1093/her/cyl094 ER
- Haines, J., Hannan, P. J., van den Berg, P., Eisenberg, M. E., & Neumark-Sztainer, D. (In Press). Weight-related teasing from adolescence to young adulthood: Longitudinal and secular trends between 1999 and 2010. *Obesity*.
- Haines, J., Neumark-Sztainer, D., Perry, C. L., Hannan, P. J., & Levine, M. P. (2006). VIK (very important kids): A school-based program designed to reduce teasing and unhealthy weight-control behaviors. *Health Education Research*, 21(6), 884–895. DOI: 10.1093/her/cyl123 ER
- Hambleton, R. K., Merenda, P. F., & Spielberg, C. D. (2005). In R. K. Hambleton, P. F. Merenda, & C. D. Spielberg (Eds.), *Adapting educational and psychological tests for cross-cultural assessment*. London: Erlbaum.
- Hill, A. J. (2007). Obesity and eating disorders. *Obesity Reviews*, 8, 151–155.
- Hudson, J. I., Hiripi, E., Pope, H. G., & Kessler, R. C. (2007). The prevalence and correlates of eating disorders in the national comorbidity survey replication. *Biological Psychiatry*, 61(3), 348–358. DOI: 10.1016/j.biopsych.2006.03.040 ER
- International Test Commission. (2010). International Test Commission guidelines for translating and adapting tests. Retrieved September/10, 2012, from <http://www.intestcom.org/upload/sitefiles/40.pdf>.
- Kelly, C., Molcho, M., & Gabbainn, S. N. (2010). Patterns in weight reduction behaviour by weight status in schoolchildren. *Public Health Nutrition*, 13(8), 1229–1236. DOI: 10.1017/S136898009992102
- Kim, O., & Kim, K. (2005). Body mass index, body shape satisfaction, and weight control behaviors among Korean girls. *Psychological Reports*, 96(3), 676–680. DOI: 10.2466/PR.96.3.676-680
- Larson, N. I., Neumark-Sztainer, D., & Story, M. (2009). Weight control behaviors and dietary intake among adolescents and young adults: Longitudinal findings from project EAT. *Journal of the American Dietetic Association*, 109(11), 1869–1877. DOI: 10.1016/j.jada.2009.08.016
- Linde, J. A., Wall, M. M., Haines, J., & Neumark-Sztainer, D. (2009a). Predictors of initiation and persistence of unhealthy weight control behaviours in adolescents. *International Journal*

- of Behavioral Nutrition and Physical Activity, 6, 72. DOI: 10.1186/1479-5868-6-72
- Linde, J. A., Wall, M. M., Haines, J., & Neumark-Sztainer, D. (2009b). Predictors of initiation and persistence of unhealthy weight control behaviours in adolescents. *International Journal of Behavioral Nutrition and Physical Activity*, 6, 72. DOI: 10.1186/1479-5868-6-72
- Lobstein, T., Baur, L., Uauy, R., & IASO International Obesity Task Force. (2004). Obesity in children and young people: A crisis in public health. *Obesity Reviews*, 5(suppl), 4-104.
- López-Guimerà, G., & Sánchez-Carracedo, D. (2010). Prevención de las alteraciones alimentarias: Fundamentos teóricos y recursos prácticos. [Disordered eating prevention: Theoretical basis and practical resources]. Madrid: Pirámide.
- López-Guimerà, G., Fauquet, J., Portell, M., Sánchez-Carracedo, D., & Raich, R. M. (2008). Dieting in Spanish adolescent girls. *European Eating Disorders Review*, 16(3), 234-240.
- López-Guimerà, G., Fauquet, J., Sánchez-Carracedo, D., Barrada, J. R., Saldaña, C., & Masnou, A. (In Press). Psychometric properties of the perception of teasing scale in a Spanish adolescent sample: POTS-S. *Eating and Weight Disorders*. DOI: 10.3275/8245
- Lopez-Guimerà, G., Levine, M. P., Sanchez-Carracedo, D., & Fauquet, J. (2010). Influence of mass media on body image and eating disordered attitudes and behaviors in females: A review of effects and processes. *Media Psychology*, 13(4), 387-416. DOI: 10.1080/15213269.2010.525737
- McCabe, M. P., & Ricciardelli, L. A. (2009). Extreme weight change behaviours: Are overweight and normal weight adolescents different, and does this vary over time? *European Eating Disorders Review*, 17(4), 301-314. DOI: 10.1002/erv.929
- Neumark-Sztainer, D. (2005). Can we simultaneously work toward the prevention of obesity and eating disorders in children and adolescents? *International Journal of Eating Disorders*, 38(3), 220-227.
- Neumark-Sztainer, D. (2007). Addressing the spectrum of adolescent weight-related problems: Engaging parents and communities. *The Prevention Researcher*, 14(3), 11-14.
- Neumark-Sztainer, D. (2009a). The interface between the eating disorders and obesity fields: Moving toward a model of shared knowledge and collaboration. *Eating and Weight Disorders-Studies on Anorexia Bulimia and Obesity*, 14(1), 51-58.
- Neumark-Sztainer, D. (2009b). Preventing obesity and eating disorders in adolescents: What can health care providers do? *Journal of Adolescent Health*, 44(3), 206-213. DOI: 10.1016/j.jadohealth.2008.11.005 ER
- Neumark-Sztainer, D., & Hannan, P. J. (2000). Weight-related behaviors among adolescent girls and boys—Results from a national survey. *Archives of Pediatrics & Adolescent Medicine*, 154(6), 569-577.
- Neumark-Sztainer, D., Wall, M., Haines, J., Story, M., & Eisenberg, M. E. (2007). Why does dieting predict weight gain in adolescents? Findings from project EAT-II: A 5-year longitudinal study. *Journal of the American Dietetic Association*, 107(3), 448-455. DOI: 10.1016/j.jada.2006.12.013
- Neumark-Sztainer, D. R., Wall, M. M., Haines, J. I., Story, M. T., Sherwood, N. E., & van den Berg, P. A. (2007). Shared risk and protective factors for overweight and disordered eating in adolescents. *American Journal of Preventive Medicine*, 33, 359-369. DOI: 10.1016/j.amepre.2007.07.031 ER
- Neumark-Sztainer, D., Story, M., Beth, L., Resnick, M. D., & Blum, R. W. (1997). Correlates of inadequate consumption of dairy products among adolescents. *Journal of Nutrition Education*, 29(1), 12-20. DOI: 10.1016/S0022-3182(97)70141-9
- Neumark-Sztainer, D., Croll, J., Story, M., Hannan, P. J., French, S. A., & Perry, C. (2002). Ethnic/racial differences in weight-related concerns and behaviors among adolescent girls and boys—Findings from project EAT. *Journal of Psychosomatic Research*, 53(5), 963-974. DOI: 10.1016/S0022-3999(02)00486-5
- Neumark-Sztainer, D., Flattum, C. F., Story, M., Feldman, S., & Petrich, C. A. (2008). Dietary approaches to healthy weight management for adolescents: The new moves model. *Adolescent Medicine: State of the Art Reviews*, 19(3), 421-428.
- Neumark-Sztainer, D., Hannan, P. J., Story, M., & Perry, C. L. (2004). Weight-control behaviors among adolescent girls and boys: Implications for dietary intake. *Journal of the American Dietetic Association*, 104(6), 913-920. DOI: 10.1016/j.jada.2004.03.021
- Neumark-Sztainer, D., Story, M., Hannan, P. J., Perry, C. L., & Irving, L. M. (2002). Weight-related concerns and behaviors among overweight and nonoverweight adolescents: Implications for preventing weight-related disorders. *Archives of Pediatrics & Adolescent Medicine*, 156(2), 171-178.
- Neumark-Sztainer, D., Wall, M., Guo, J., Story, M., Haines, J., & Eisenberg, M. (2006). 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), 559-568.
- Neumark-Sztainer, D., Wall, M., Larson, N., Story, M., Fulkerson, J. A., Eisenberg, M. E., et al. (2012). Secular trends in weight status and weight-related attitudes and behaviors in adolescents from 1999-2010. *Preventive Medicine*, 54, 77-81. DOI: 10.1016/j.ypmed.2011.10.003
- Neumark-Sztainer, D., Wall, M., Story, M., & Sherwood, N. E. (2009). Five-year longitudinal predictive factors for disordered eating in a population-based sample of overweight adolescents: Implications for prevention and treatment. *International Journal of Eating Disorders*, 42(7), 664-672. DOI: 10.1002/eat.20733
- Neumark-Sztainer, D., Wall, M., Story, M., & Standish, A. R. (2012). Dieting and unhealthy weight control behaviors during adolescence: Associations with 10-year changes in body mass index. *Journal of Adolescent Health*, 50(1), 80-86. DOI: 10.1016/j.jadohealth.2011.05.010
- OCDE. (2012). Obesity and the economics of prevention fit not fat. Retrieved January/28, 2012, from http://www.oecd.org/document/31/0,3746,en_2649_33929_4599775_1_1_1,00.html
- O'Dea, J. A. (2005). Prevention of child obesity: 'first, do no harm'. *Health Education Research*, 20(2), 259-265. DOI: 10.1093/her/cyg116 ER
- Patton, G. C., Carlin, J. B., Shao, Q., Hibbert, M. E., Rosier, M., Selzer, R., et al. (1997). Adolescent dieting: Healthy weight control or borderline eating disorder? *Journal of Child Psychology and Psychiatry, and Allied Disciplines*, 38(3), 299-306. DOI: 10.1111/j.1469-7610.1997.tb01514.x
- Patton, G. C., Selzer, R., Coffey, C., Carlin, J. B., & Wolfe, R. (1999). Onset of adolescent eating disorders: Population based cohort study over 3 years. *British Medical Journal*, 318(7186), 765-768.
- Pisetsky, E. M., Chao, Y. M., Dierker, L. C., May, A. M., & Striegel-Moore, R. H. (2008). Disordered eating and substance use in high-school students: Results from the youth risk behavior surveillance system. *International Journal of Eating Disorders*, 41(5), 464-470. DOI: 10.1002/eat.20520
- Rawana, J. S., Morgan, A. S., H. Nguyen, & Craig, S. G. (2010). The relation between eating- and weight-related disturbances and depression in adolescence: A review. *Clinical Child and Family Psychology Review*, 13(3), 213-230. DOI: 10.1007/s10567-010-0072-1
- Sánchez-Carracedo, D., & Saldaña, C. (1998). Evaluación de los hábitos alimentarios en adolescentes con diferentes índices de masa corporal. *Psicothema*, 10, 281-292.
- Sánchez-Carracedo, D., Barrada, J. R., López-Guimerà, G., Fauquet, J., Almenara, C. A., & Trepal, E. (2012). Analysis of the factor structure of the Sociocultural Attitudes Towards Appearance Questionnaire (SATAQ-3) in Spanish secondary students through exploratory structural equation modelling. *Body Image*, 9, 163-171. DOI: 10.1016/j.bodyim.2011.10.002
- Sánchez-Carracedo, D., Neumark-Sztainer, D., & López-Guimerà, G. (In Press). Integrated prevention of obesity and eating disorders: Barriers, developments and opportunities. *Public Health Nutrition*. DOI: 10.1017/S1368890012000705
- Sánchez-Carracedo, D., Saldaña, C., & Doménech, J. M. (1996). Obesity, diet and restrained eating in a mediterranean population. *International Journal of Obesity*, 20, 943-950.
- Santos, M., Richards, C. S., & Bleckley, M. K. (2007). Comorbidity between depression and disordered eating in adolescents. *Eating Behaviors*, 8(4), 440-9. DOI: 10.1016/j.eatbeh.2007.03.005
- Serra-Majem, L., Aranceta Bartrina, J., Perez-Rodrigo, C., Ribas-Barba, L., & Delgado-Rubio, A. (2006). Prevalence and determinants of obesity in Spanish children and young people. *British Journal of Nutrition*, 96, S67-S72. DOI: 10.1079/BJN20061703
- Shaw, H., Ng, J., & Stice, E. (2007). Integrating eating disorder and obesity prevention programs for adolescents. *The Prevention Researcher*, 14(3), 18-20.
- Stice, E., & Bearman, S. K. (2001). Body-image and eating disturbances prospectively predict increases in depressive symptoms in adolescent girls: A growth curve analysis. *Developmental Psychology*, 37(5), 597-607. DOI: 10.1037/0012-1649.37.5.597
- Stice, E., Cameron, R. P., Killen, J. D., Hayward, C., & Taylor, C. B. (1999). Naturalistic weight-reduction efforts prospectively predict growth in relative weight and onset of obesity among female adolescents. *Journal of Consulting and Clinical Psychology*, 67(6), 967-974.
- Stice, E., Presnell, K., Shaw, H., & Rohde, P. (2005). Psychological and behavioral risk factors for obesity onset in adolescent girls: A prospective study. *Journal of Consulting and Clinical Psychology*, 73(2), 195-202. DOI: 10.1037/0022-006X.73.2.195 ER
- Stigler, M. H., Arora, M., Dhavan, P., Shrivastav, R., Reddy, K. S., & Perry, C. L. (2011). Weight-related concerns and weight-control behaviors among overweight adolescents in Delhi, India: A cross-sectional study. *International Journal of Behavioral Nutrition and Physical Activity*, 8, 9. DOI: 10.1186/1479-5868-8-9
- Stock, S., Miranda, C., Evans, S., Plessis, S., Ridley, J., Yeh, S., et al. (2007). Healthy buddies: A novel, peer-led health promotion program for the prevention of obesity and eating disorders in children in elementary school. *Pediatrics*, 120, e1059-E1068. DOI: 10.1542/peds.2006-3003 ER
- Tomiyama, A. J., Mann, T., Vinas, D., Hunger, J. M., DeJager, J., & Taylor, S. E. (2010). Low calorie dieting increases cortisol. *Psychosomatic Medicine*, 72(4), 357-364. DOI: 10.1097/PSY.0b013e3181d9523c
- Trichopoulou, A., Costacou, T., Bamia, C., & Trichopoulos, D. (2003). Adherence to a Mediterranean diet and survival in a Greek population. *The New England Journal of Medicine*, 348(26), 2599-2608. DOI: 10.1056/NEJMoa025039
- Turner, J. M., Bulsara, M. K., McDermott, B. M., Byrne, G. C., Prince, R. L., & Forbes, D. A. (2001). Predictors of low bone density in young adolescent females with anorexia nervosa and other dieting disorders. *International Journal of Eating Disorders*, 30(3), 245-251. DOI: 10.1002/eat.1081
- Wall, M. M., Larson, N. I., Forsyth, A., Van Riper, D. C., Graham, D. J., Story, M. T., et al. (2012). Patterns of obesogenic neighborhood characteristics and adolescent weight status. *American Journal of Preventive Medicine*, 42(5), e65-75. DOI: 10.1016/j.amepre.2012.02.009
- Zhang, J., Seo, D., Kolbe, L., Lee, A., Middlestadt, S., Zhao, W., et al. (2011). Comparison of overweight, weight perception, and weight-related practices among high school students in three large Chinese cities and two large U.S. cities. *Journal of Adolescent Health*, 48(4), 366-372. DOI: 10.1016/j.jadohealth.2010.07.015