

# Prevalence of Weight Control Behaviors among Adolescent Girls

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**Keywords:** Body mass index, dieting, disordered eating, weight perception.

**Abstract:** Dieting or weight control behaviors have become increasingly widespread among adolescents, particularly adolescent girls. Girls may engage in a range of weight control behaviors, from healthy, such as exercising and eating more fruit and vegetables, to unhealthy and extreme strategies including fasting, skipping meals, and taking diet pills. The purpose of this study was to systematically review existing literatures on the prevalence of weight control behaviors among adolescent girls in Western and non-Western countries. Studies were identified through a systematic search using PsycINFO, Google Scholar and secondary references. Thirty studies published between 1983 and 2016 in 10 countries were identified and divided into 3 groups of years, i.e. 1980-1999, 2000-2009 and 2010-2016. The findings across the three groups showed that: (a) the prevalence of weight control behaviors among adolescent girls was associated with weight status and weight perception; (b) exercising was the most frequently reported healthy strategy; (c) skipping meals, fasting, self-induced vomiting, taking diet pills and using laxatives were the frequently reported unhealthy and extreme weight control behaviors. Implications for future research include conducting more studies on weight control behaviors among adolescents in different countries for designing prevention and intervention programs to combat the negative consequences of unhealthy and extreme behaviors.

## 1 INTRODUCTION

The onset of puberty in adolescence causes changes in the distribution of fat and muscle tissue in adolescent boys and girls. Consequently, both boys and girls become more concerned about their weight and physical appearance. However, studies have shown that adolescent girls are more likely than boys to consider themselves overweight, so they manifest greater efforts to lose weight (Gonsalves, Hawk and Goodenow, 2014; Grunbaum et al., 2002; Neumark-Sztainer and Hannan, 2000; Rosen, Gross and Vara, 1987). Dieting behavior is motivated by concerns about obesity and the belief that dieting will help improve physical appearance (French and Jeffery, 1994; Tam et al., 2007; Neumark-Sztainer and Hannan, 2000).

Around the 1990s up to now, researchers have used the term 'weight control behavior' besides 'dieting behavior' (Serdula et al., 1993; Utter et al., 2003; Balantekin, Birch and Savage, 2015; Park and Lee, 2017; Bojorquez et al., 2018). Balantekin et al. (2015) indicated that dieting was an umbrella term for a wide range of both healthy and unhealthy

weight control behaviors instead of just a singular behavior. Weight control behaviors can be divided into healthy, unhealthy and extreme behaviors (Neumark-Sztainer et al., 2002; Quick et al., 2013; Al Sabbah et al., 2010). Healthy weight control behaviors include exercising, eating more fruit and vegetables, eating less high-fat food, eating fewer sweets, drinking less soda pop, and watching portion sizes. Whereas fasting, eating very little food, using a food substitute, skipping meals and smoking cigarettes are categorized as unhealthy weight control behaviors. Furthermore, using laxatives, using diuretics, taking diet pills and self-induced vomiting are included in extreme behaviors because of their harmful consequences for health. Unhealthy and extreme weight control behaviors can lead to several negative consequences, such as greater weight gain and increased risk of obesity (Field et al., 2010; Neumark-Sztainer et al., 2012; Stice et al., 2005); increased risk of developing eating disorder (Patton et al., 1990, 1999; Polivy and Herman, 1985) and nutritional deficiencies (Neumark-Sztainer et al., 2004).

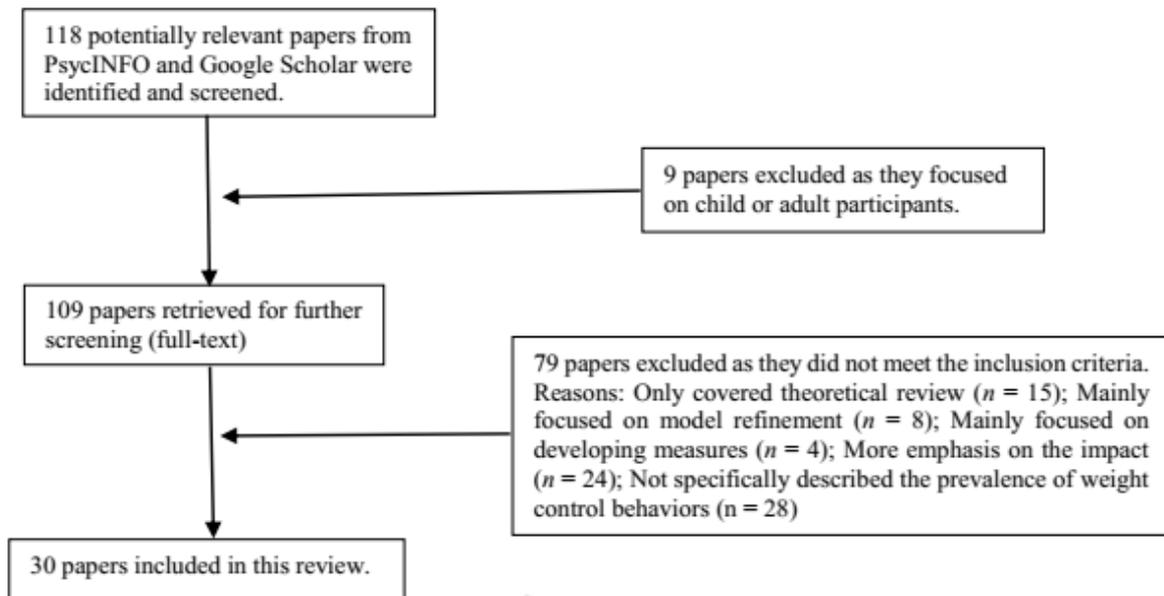


Figure 1: Flow chart of the literature selection process.

To date, studies on the prevalence of dieting or weight control behaviors in adolescents have been widely conducted in Western countries, but a few were still conducted in non-Western contexts. The aim of this present study is to provide a description of the literature on the prevalence of dieting or weight control behaviors in adolescent girls by reviewing empirical studies from 1980 to 2016 conducted in the US and other Western and non-Western countries. Results are expected to contribute insights for further research in other countries, particularly non-Western countries, about this problem and suggest the necessity of more effective prevention and intervention programs.

## 2 METHODS

### 2.1 Data Sources and Literature Search

Researchers used electronic databases (PsycINFO and Google Scholar) to search for relevant articles published from 1980 to 2016 using the following keywords: “weight control behavior”, “dieting behavior”, “excessive dieting”, “disordered eating”, “eating disorder”, “body dissatisfaction” and “adolescence”. All previous review articles (i.e. systematic and unsystematic reviews identified

during the database search) were also read for additional published articles. Theses and dissertations were not included in this systematic review because their peer review status is not always reported and they are often not easily accessible. Researchers also conducted a manual examination of selected articles’ reference lists to acquire further relevant studies. Each article was read in full to determine whether it fitted the inclusion criteria for this review.

### 2.2 Selection Procedures

Following the database searches, 118 studies were identified by screening the titles and abstracts of selected studies. The inclusion criteria for selected studies were as follows: (a) empirical studies using quantitative or qualitative methods, or both, in peer reviewed journals from 1980 to 2016; (b) studies conducted with adolescents or adolescent girls, especially those in middle and high school; (c) studies with a focus on the prevalence of dieting or weight control behaviors. The exclusion criteria were as follows: (a) studies conducted with children or adults; (b) articles not written in English. Hereinafter, the researchers verified the full texts of those selected studies using the inclusion and exclusion criteria established. Figure 1 illustrates the flowchart of the literature selection process.

Table 1: Prevalence of dieting or weight control behaviors in 1980-1999.

Context	Researcher, Year; Location	Sample (N), Age / Grade	Summary of Findings
United States, 1980s	Storz & Greene (1983); Philadelphia	Adolescent girls (203), 14-18	Desired to lose weight (83%), although (62%) actually fell within average range of body weight; gain weight (14%); maintain weight (2%). Low-energy crash diet was second in popularity only to an exercise program; the less healthful methods comprised 41.5% of the attempts mentioned.
	Rosen et al. (1987); Rosen & Gross (1987); Northeast	Adolescents (698 boys; 675 girls), grade 9-12	Girls: reducers (63%), maintainers (27.9%), gainers (9.1%). Boys: reducers (16.2%), maintainers (55.4%), gainers (28.4%). Most female reducers and male gainers were already normal weight. Exercise, reducing calories, omitting snacks, and skipping meals were the four most popular methods of weight reduction for boys and girls.
Israel, 1990s	Neumark Sztainer et al. (1995); Jerusalem	Adolescent girls (341), 15.3 (mean)	A high percentage of the girls (41.9%) viewed themselves to be overweight compared with girls (17.4%) who could objectively be defined as overweight with BMI values of at least 23.8. Girls desired to weigh an average of 4 kg less than their perceived weight. Girls exclusively used healthy weight loss methods in the past (8.2%), used unhealthy methods (39%), and an additional 23.2% used very unhealthy methods: fasting, vomiting, laxatives or diet pills.
United States, 1990s	Story et al. (1991); French et al. (1995); Minnesota	Adolescents (16725 boys; 17471 girls), grade 7-12	Dieted to lose weight during the last year (61.9%) of female students and 20.1% of male students; chronic dieters (12.1% and 2.1%, respectively). Chronic dieters (reported had been on a diet > 10 times or always dieting during the past year): feel overweight (75.7% of female students and 42.7% of male students); self-induced vomiting weekly or more (11.9% and 4.7%, respectively); use of laxatives (7.9% and 4.4%, respectively); use of ipecac (2.5% and 1.1% respectively); and use of diuretics (7.3% and 2.7%, respectively). Others: feel overweight (38.4% of female students and 16.3% of male students); self-induced vomiting weekly or more (1.2% and 0.5%, respectively); use of laxative (1.1% and 0.4%, respectively); use of ipecac (0.3% and 0.1%, respectively), and use of diuretics (1.0% and 0.2%, respectively).
	Serdula et al. (1993); 50 states, District of Columbia, Virgin Islands	Adolescents (5585 boys; 5882 girls), grade 9-12 and adults ≥ 18 years (60861)	Female students: reported trying to lose weight (44%); trying to keep from gaining weight (26%); trying to gain weight (7%); and not trying to do anything about their weight (23%). Male students: reported trying to lose weight (15%); trying to keep from gaining weight (15%); trying to gain weight (26%); and not trying to do anything about their weight (44%). Among both male and female students, attempts to lose weight were most strongly associated with weight perception, although less so among blacks. Methods used to lose or maintain weight in the 7 days preceding the survey: exercising (51% of female students and 30% of male students), skipping meals (49% and 18%, respectively), using diet pills (4% and 2%, respectively), and vomiting (14% and 4%, respectively).
	Neumark-Sztainer et al. (1999); Connecticut	Adolescents (9118), grade 7, 9, 11	Weight loss behaviors over the past 7 days: exercise (61% of female students and 42.8% of male students); dieting (38.2% and 12.4%, respectively); disordered eating (vomiting, diet pills, laxatives or diuretics, 7.4% and 3.1%, respectively). BMI was positively associated with dieting and exercise among the girls. The very overweight girls were at greater risk of disordered eating behaviors.

Table 1 (Continued).

Context	Researcher, Year; Location	Sample (N), Age / Grade	Summary of Findings
Japan, 1990s	Kaneko et al. (1999); Osaka Prefecture	Preadolescents (547) and adolescents (1085), 10-17	Forty-eight per cent of 10-year-old girls and 84% of 17-year-old girls categorized themselves as 'fat' or 'too fat'. Approximately 30% of boys in each age group categorized themselves as 'fat' or 'too fat'. The fear of weight gain and desire for thinness was reported in 35% and 51% of 10-year-old girls, respectively, and increased progressively with ageing to 79% and 87% of 17-year-old girls. In contrast, these were reported by 20–30% of boys in the corresponding age groups. Some practices to be slim were found in 22% of the 10-year-old girls, and increased to 37% among the 17-year-old girls, whereas they were found in around 20% of the boys at each age.

### 3 RESULTS

#### 3.1 Studies' Characteristics

After going through the selection process, we identified 30 studies to be reviewed further. All of these studies were conducted between 1980 and 2016 with adolescents. The majority of these studies were conducted in the United States ( $n = 22$ ) and the remaining in other countries, including Israel, Japan, Europe, Hong Kong, Palestine, Greece, New Zealand, Spain, and Korea. Studies published in 2016 were also included so that the researchers could describe the latest research on the prevalence of weight control behaviors in adolescents.

The 30 studies were selected for further review because they described specifically the prevalence of dieting or weight control behaviors, which could be categorized into healthy, unhealthy and extreme behaviors. The description of prevalence was often associated with sex, weight status and weight perception. Through the specific descriptions, researchers could gain an insight into the severity of weight control behaviors in adolescents, particularly adolescent girls, thus raising the need to prevent or overcome this problem.

#### 3.2 Prevalence of Dieting or Weight Control Behaviors in 1980-1999 (see Table 1)

Adolescent girls in the US were significantly more likely than adolescent boys to engage in dieting and mostly were trying to lose weight (French et al.,

1995; Rosen et al., 1987; Serdula et al., 1993; Story et al., 1991). For example, Serdula et al. (1993) found that nearly half of girls (44%) attempted to lose weight compared with only 15% of boys trying to lose weight. Interestingly, we also found a similar prevalence among adolescent girls and boys in Japan (Kaneko et al., 1999).

Dieting behaviors in adolescents girls were more likely to be associated with weight perception than weight status (Kaneko et al., 1999; Neumark-Sztainer et al., 1995; Rosen & Gross 1987; Rosen et al., 1987; Serdula et al., 1993; Storz & Greene 1983). For example, Rosen and Gross (1987) and Rosen et al. (1987) found that most adolescent girls who tried to lose weight actually already had a normal weight. Storz and Greene (1983) also found high percentage of girls (62%) who desired to lose weight actually had normal body weight.

Healthy weight control behavior, mostly performed by adolescent girls was exercising (Neumark-Sztainer et al., 1999; Rosen and Gross, 1987; Serdula et al., 1993; Storz and Greene, 1983). Nevertheless, adolescent girls also engaged in unhealthy weight control behaviors, such as skipping meals and fasting, and extreme behaviors including self-induced vomiting, using laxatives, and taking diet pills (Neumark-Sztainer, Palti and Butler, 1995; Serdula et al., 1993; Story et al., 1991).

Table 2: Prevalence of dieting or weight control behaviors in 2000-2009.

Context	Researcher, Year; Location	Sample (N), Age / Grade	Summary of Findings
United States, 2000s	Neumark-Sztainer & Hannan (2000); Minnesota	Adolescents (6728), grade 5-12	Almost half of the girls (45%) reported that they had at some point been on a diet, compared with 20% of the boys. Among girls and boys, there were strong direct associations between BMI and dieting behaviors. Younger girls (grades 5-8) were significantly less likely to engage in dieting than older girls (grades 9-12).
	Boutelle et al. (2002); Connecticut	Adolescents (4081 boys; 4249 girls), grade 7, 9, 11	The prevalence of unhealthy weight control behaviors (laxatives, diet pills, vomiting) was directly related to overweight status in both female and male adolescents. A higher percentage of obese girls and boys engaged in unhealthy weight control behaviors, followed by the overweight girls and boys, and with the lowest level of these behaviors seen in the non-overweight girls and boys.
	Croll et al. (2002); Minnesota	Adolescents (39,714 boys; 40,640 girls), grade 9 and 12	Fifty-six percent of 9th-grade females and 28% of 9th-grade males report disordered eating behaviors to lose or control weight (fasting or skipping meals, diet pills, vomiting, laxatives or smoking cigarettes; and binge-eating), with slightly higher rates among 12th-grade females and males, 57% and 31%, respectively. Fasting or skipping meals was the most commonly reported behavior, followed by smoking cigarettes to control weight, taking diet pills, vomiting and laxatives.
	Grunbaum et al. (2002); 50 states and District of Columbia	Adolescents (13,601), grade 9-12	Female students (34.9%) were significantly more likely than male students (23.3%) to consider themselves overweight. Overall, female students (62.3%) were significantly more likely than male students (28.8%) to be trying to lose weight. Female students (58.6%) were significantly more likely than male students (28.2%) to have eaten less food, fewer calories, or foods low in fat to lose weight or to avoid gaining weight. Unhealthy behaviors to lose weight or avoid gaining weight: had gone without eating for $\geq 24$ hours (19.1% of female students and 7.6% of male students); had taken diet pills, powders, or liquids without a doctor's advice (12.6% and 5.5%, respectively); had vomited or taken laxatives (7.8% and 2.9%, respectively).
	Neumark-Sztainer et al. (2002); Neumark-Sztainer et al. (2003); Minnesota	Adolescents (4746, 50.2% boys; 49.8% girls), 14.9 (mean)	Healthy weight control behaviors (85% of adolescent girls and 70% of adolescent boys); unhealthy behaviors (57% and 33%, respectively); or extreme behaviors (12% and 5%, respectively). The use of unhealthy and extreme weight control behaviors was high among overweight youth, particularly adolescent girls. Extreme weight control practices (taking diet pills, laxatives, or diuretics or vomiting) were reported by 18% of very overweight adolescent girls, compared with 6% of very overweight adolescent boys. Unhealthy weight control behaviors: ate very little food (girls: 44.9%; boys: 19.3%); skipped meals (girls: 44.7%; boys: 18.3%); fasted (girls: 18.0%; boys: 11.1%); used food substitutes (girls: 9.6%; boys: 6.2%); smoked cigarettes (girls: 9.1%; boys: 4.6%); self-induced vomiting (girls: 6.6%; boys: 2.2%); took diet pills (girls: 6.7%; boys: 1.7%); took diuretics (girls: 1.6%; boys: 1.7%); and used laxatives (girls: 1.7%; boys: 1.0%). Frequent dieting (more than 5 times over the past year) was reported by 18.2% of girls and 7.9% of boys.

Table 2 (Continued).

Context	Researcher, Year; Location	Sample (N), Age / Grade	Summary of Findings
United States, 2000s	Eisenberg et al. (2005); Minnesota	Adolescent girls (2308)	Many girls (44.9%) reported engaging in UWCBs. Overweight girls (60.1%) were more likely to engage in UWCBs than moderately overweight (54.0%), average weight (40.2%), or underweight (21.3%) girls.
Europe, Israel, United States, 2000s	Ojala et al. (2007); Over 30 countries in Europe, Israel, North America	Adolescents (50965 boys; 55154 girls), 13 and 15	Weight loss attempts at the time of the survey were significantly higher in overweight adolescents than non-overweight adolescents. Overall, overweight girls tended to try to lose weight and feel the need to lose weight more commonly than overweight boys. The majority (76-98%) of overweight girls, in all countries and regions, were either currently trying or felt that they should lose some weight. By contrast, overweight boys considered their weight to be fine or wanted to gain weight (range: 19-64%) more commonly than overweight girls. Specific weight control practices used during the previous 12 months by weight status: Exercising (range 71-97%) and eating fewer sweets (28-100%) were the most commonly indicated weight control practices among both overweight and non-overweight adolescents in all countries and both genders, with the exception of Latvian overweight girls. Unhealthy practices such as fasting (range 4-30%), vomiting (1-14%), diet pills or laxative use (0-19%) and smoking more (3-17%) were less frequently, but still considerably, mentioned. Self-perception of overweight was the most effective individual-level factor. Self-perception of overweight was followed by body weight status and age.
Hong Kong, 2000s	Tam et al. (2007); Hong Kong	Adolescents (1335 boys, 14.6 (mean); 1047 girls, 14.8 (mean))	Weight loss behaviors were reported by 638 (26.8%) participants. Among them, 58% were female. Exercise and dieting were the most popular means whereas the expensive beauty salon slimming treatment was the least common. A significant number of them (20.5%) had resorted to hazardous weight control methods like the use of diet pills (19.5%) and/or self-induced vomiting (3%). Overall, only 22% of slimmers had received professional advice from health-care professionals while 30% underwent weight reduction without the awareness of their families.

### 3.3 Prevalence of Dieting or Weight Control Behaviors in 2000-2009 (see Table 2)

Adolescent girls in the US, Europe, Israel and Hong Kong showed a higher percentage of weight loss attempts than boys (Neumark-Sztainer & Hannan, 2000; Grunbaum et al., 2002; Ojala et al., 2007; Tam et al., 2007). Grunbaum et al. (2002) showed that more than half of adolescent girls in the US (62.3%) compared with 28.8% of adolescent boys in the US tried to lose weight. Tam et al. (2007) also reported

that 58% female adolescents in Hong Kong showed weight-loss behaviors.

Dieting behaviors in adolescent girls were more associated with weight status (Neumark-Sztainer and Hannan, 2000; Boutelle et al., 2002; Eisenberg et al., 2005; Ojala et al., 2007) (Boutelle et al. 2002; Eisenberg et al., 2005; Neumark-Sztainer & Hannan 2000; Ojala et al., 2007) than weight perception (Grunbaum et al., 2002). In over 30 countries, Ojala et al. (2007) found that the majority of overweight girls were trying or felt that they should lose some weight.

The most common healthy weight control behavior applied by adolescent girls was exercising

(Ojala et al., 2007; Tam et al., 2007). However, adolescent girls also utilized unhealthy and extreme weight control behaviors, such as skipping meals, fasting, smoking more cigarettes, taking diet pills, using laxatives and self-induced vomiting (Croll et al., 2002; Grunbaum et al., 2002; Neumark-Sztainer et al., 2003; Eisenberg et al., 2005; Tam et al., 2007). Neumark-Sztainer et al. (2003) found that while most adolescent girls (85%) reported using healthy weight control behaviors, they also engaged in unhealthy weight control behaviors (57%) and extreme behaviors (12%).

### 3.4 Prevalence of Dieting or Weight Control Behaviors in 2010-2016 (see Table 3)

Adolescent girls in the US (Haley, Hedberg and Leman, 2010; L pez-Guimer  et al., 2013; Gonsalves, Hawk and Goodenow, 2014), Palestine (Al Sabbah et al., 2010), Spain (L pez-Guimer  et al., 2013), and New Zealand (Utter et al., 2012) were more likely than boys to engage in dieting to lose weight. For example, Utter et al. (2012) reported that a higher percentage of girls (67%) than boys (36%) in New Zealand attempted to lose weight in the past year.

Weight control behaviors in adolescent girls were associated with weight status (Lee and Lee, 2016; Vander Wal, 2011; Al Sabbah et al., 2010) and weight perception (Haley, Hedberg and Leman, 2010; Lee and Lee, 2016; Vander Wal, 2011). Al Sabbah et al. (2010) reported that overweight

adolescent girls (16.6%) were more likely than normal and underweight adolescent girls (6.5% and 5.4%, respectively) to engage in dieting to lose weight. In addition, Haley et al. (2010) found that more girls than boys perceived themselves as overweight and tried to lose weight. Exercising was the most common healthy weight control behavior utilized by adolescent girls (Lee and Lee, 2016; Utter et al., 2012). Nevertheless, quite a lot of adolescent girls in the US (Bucchianeri et al., 2016; Johnson et al., 2016; Mayer-Brown et al., 2016; Vander Wal, 2011), US and Spain (L pez-Guimer  et al., 2013), Greece (Th gersen-Ntoumani, Ntoumanis and Nikitaras, 2010), and New Zealand (Utter et al., 2012) engaged in unhealthy and extreme weight control behaviors, such as skipping meals, fasting, eating very little food, taking diet pills, using laxatives and self-induced vomiting. L pez-Guimer  et al. (2013) found that unhealthy weight control behaviors were prevalent among North American and Spanish adolescent girls. In addition, Mayer-Brown et al. (2016) found that US girls were more likely and more frequently to utilize unhealthy weight control behaviors than boys, such as eating very little food (32%), skipping meals (27.8%), skipping breakfast (23.7%) and fasting (10.3%).

Table 3: Prevalence of dieting or weight control behaviors in 2010-2016.

Context	Researcher, Year; Location	Sample (N), Age / Grade	Summary of Findings
Palestine, 2010s	Al Sabbah et al. (2010); Palestine	Adolescents (8,885), 12-18	Dieting to lose weight was significantly higher among overweight adolescents (boys: 10.8%; girls: 16.6%) than underweight (boys: 8.2%; girls: 5.4%) and normal weight pupils (boys: 5.2%; girls: 6.5%). Healthy weight-control behaviors were highly prevalent in both genders; underweight adolescents reported the lowest rates and overweight reported the highest rates. Unhealthy and extreme behaviors to control weight were more prevalent among overweight adolescents than normal weight and underweight counterparts. Adolescents who perceived their body as too thin were less likely than adolescents who perceived their body as normal size to exercise, whereas adolescents who perceived their body as too fat were more likely than adolescents who perceived their body as average size to follow an unhealthy diet.

Table 3 (Continued).

Context	Researcher, Year; Location	Sample (N), Age / Grade	Summary of Findings
Greece, 2010s	Thøgersen-Ntoumani, Ntoumanis, & Nikitaras (2010); Athens	Adolescent girls (350), 12-16	Many Greek adolescent females engaged in unhealthy weight control behaviors: skipping meals (67.4%), fasting for a day or more (31.1%), vomiting (10.3%), laxatives and/or water pills (3.4%) and diet pills (3.1%).
United States, 2010s	Haley, Hedberg, & Leman (2010); Oregon	Adolescents (16289, 49.8% boys; 50.1% girls), grade 8 and 11	Unhealthy weight loss practices (UWLP) were reported by 11.6% of students, more often by girls than boys. Prolonged fasting was more prevalent than vomiting, taking laxatives or taking dietary medication without a doctor's advice. More girls than boys perceived themselves as overweight and reported trying to lose weight. Interestingly, 45% of respondents who perceived themselves as slightly overweight, and 17% of those who perceived being very overweight had healthy BMIs. Being overweight, or at risk of it, was associated with UWLP, as was self-perception of being very underweight or overweight.
	Vander Wal (2011)	Adolescents (2,120 boys; 2,409 girls), grade 9 and 10	Unhealthy weight control behaviors were skipping meals (23.3% of boys; 46.6% of girls), fasting (7.4% of boys; 16.0% of girls), restricting one's diet to one or more food groups (7.5% of boys; 12.9% of girls), using diet pills (3.6% of boys; 8.9% of girls), smoking to lose weight (5.6% of boys; 6.6% of girls) and vomiting (2.4% of boys; 6.6% of girls). Adolescents with overweight and obese BMI classifications were more likely to engage in unhealthy weight control behaviors than adolescents with a healthy weight classification. Adolescents who perceived themselves to be too fat were more likely to engage in unhealthy weight control behaviors than adolescents who did not perceive themselves to be too fat.
New Zealand, 2010s	Utter et al. (2012); New Zealand	Adolescents (9,170), 13-18	Half of the students (50.1%) have made a weight loss attempt in the past year (67% of girls; 36% of boys). Exercising (90%), eating less fatty foods (72%), eating fewer sweets (52%) and skipping meals (31%) were the most commonly used strategies for weight loss.
United States and Spain, 2010s	López-Guimerà et al. (2013), 14.3 (mean); Twin Cities, Minnesota and Barcelona	Adolescents (1501 Barcelona: 48% girls, 52% boys; and 2793 Twin Cities: 53% girls, 47% boys)	Dieting and UWCB were prevalent in both samples, particularly among girls, but the prevalence was higher in the US sample (dieting: 45.7%; eating very little food: 38.8%; skipping meals: 36.6%; fasting: 13.5%) than Spain (dieting: 33.9%; eating very little food: 19%; skipping meals: 14.6%; fasting: 8.5%). Among adolescent girls, 27.9% of the BCN sample and 48.9% of the TC sample reported use of any less extreme UWCB. Among adolescent boys, these corresponding percentages were 12.0% for BCN and 38.0% for TC. 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 despite low numbers. In both countries, the report of dieting and use of UWCB was highest among overweight and obese youth.

Table 3 (Continued).

Context	Researcher, Year; Location	Sample (N), Age / Grade	Summary of Findings
United States, 2010s	Gonsalves et al. (2014); Massachusetts	Adolescents (11,515), grade 6-12	Among middle and high school students, females were more likely than males to report unhealthy weight control behaviors (10.9 vs. 6.9%, 15.8 vs. 7.3%, respectively). Among both middle and high school females, those who had an overweight or obese BMI were more likely to report unhealthy weight control behaviors than those with a normal weight BMI (16.0, 18.6 vs. 10.0% in middle school and 26.2, 27.9 vs. 12.1%, in high school). Among middle and high school females, those who thought they were slightly or very overweight were more likely to report unhealthy weight control behaviors than those who thought they were about the right weight (16.0 vs. 9.2% in middle school and 28.0 vs. 10.3% in high school). The same pattern held for high school males (14.2 vs. 4.2%).
	Bucchianeri et al. (2016); Minnesota	Adolescents (2,793, 46.8% boys; 53.2% girls), 14.4 (mean)	Dieted to lose weight during the last year (45.9% of adolescent girls and 31.1% of adolescent boys); unhealthy WCBs (50.3% and 38.1%, respectively); extreme WCBs (6.7% and 3.9%, respectively).
	Johnson et al., (2016); 5 states	Adolescents (2004 boys; 2144 girls), grade 9-12	Unhealthy WCBs to keep from gaining weight during past 30 days: fasted for at least 24 hours (12.7%); used diet pills, powders or liquids (5.3%); vomited or used laxatives (5.2%). Girls were more likely to report fasting (69.9% vs. 30.1%), using diet pills, powders or liquids (67.0% vs. 33%), and vomiting or taking laxatives (71.2% vs. 28.8%) to lose weight compared with boys.
	Lampard et al. (2016); Minnesota	Adolescents (1307 boys; 1486 girls), grade 6-12	Mixed healthy and unhealthy (34% of adolescent girls and 25.2% of adolescent boys); unhealthy only (16.4% and 13%, respectively); healthy only (24% and 29.2%, respectively). The exclusive use of healthy weight control behaviors was more prevalent among girls who were not overweight (27.5%) as compared to girls who were overweight (21.0 %) or obese (17.5 %).
	Mayer-Brown, Lawless, Fedele, Dumont-Driscoll, & Janicke (2016)	Adolescents (82 boys; 97 girls), 10-17	Overall, 40.8% of youth endorsed using at least one unhealthy weight control behavior over the past year. Ate very little food at meals (28%) and skipped meals (24%) were the most commonly reported UWCBs. Girls reported using more UWCBs, as well as engaging in UWCBs more frequently than boys. Endorsed UWCBs: ate very little food (32% of girls and 23.2% of boys); skipped meals (27.8% and 19.5%, respectively); skipped breakfast (23.7% and 12.2% respectively); and fasted (10.3% and 6.1%, respectively). The most commonly endorsed extreme UWCB among boys in the last year was using laxatives (3.7%), while taking diet pills and using laxatives (4.1%) were the most common among girls.

Table 3 (Continued).

Context	Researcher, Year; Location	Sample (N), Age / Grade	Summary of Findings
Korea, 2010s	Lee & Lee (2016); South Korea	Adolescents (9,211 boys; 11,053 girls), 12-18	Higher percentage of subjects in the under-estimation group did nothing to control their weight (66.5%) compared to 54.5% in the correct estimation group and 40.3% in the overestimation group. Half of subjects in the over-estimation group made an effort to lose weight (49.6%). However, almost one out of three subjects made an effort to lose weight in the correct estimation group (30.6%). The most common weight control behavior was 'doing regular exercise' (68.5%), followed by 'eating less' (68.1%), fasting $\geq$ 24 h (8.5%), eating food substitute (8.5%) and eating one-food diet (6.7%).

## 4 DISCUSSION

A literature review of studies conducted from 1980 to 2016 found that the prevalence of dieting or weight control behaviors in adolescent girls was high, either in the United States (e.g. Rosen, Gross & Vara, 1987; Story et al., 1991; Serdula et al., 1993; Grunbaum et al., 2002; Neumark-Sztainer et al., 2002; Eisenberg et al., 2005; Vander Wal, 2011; Gonsalves, Hawk & Goodenow, 2014; Bucchianeri et al., 2016; Mayer-Brown et al., 2016) or in other countries, such as Japan (Kaneko et al., 1999), Europe and Israel (Ojala et al., 2007), Palestine (Al Sabbah et al., 2010), Greece (Thøgersen-Ntoumani, Ntoumanis and Nikitaras, 2010), New Zealand (Utter et al., 2012) and Korea (Lee and Lee, 2016). Dieting behavior becomes a complex issue in adolescence because they are still undergoing rapid changes in growth, physical maturity, self-concept, body image and relationships with peers (Brownell and Rodin, 1994). According to Attie and Brooks-Gunn (1989), body weight and shape became the main focus for most adolescent girls since the onset of puberty and efforts to control weight were increasing.

A literature review on studies over three decades found that the prevalence of weight control behaviors in adolescent girls was more associated with weight perception in 1980-1999 (e.g. Storz & Greene, 1983; Neumark-Sztainer, Palti & Butler, 1995; Kaneko et al., 1999); with weight status in 2000-2009 (e.g. Neumark-Sztainer & Hannan, 2000; Boutelle et al., 2002; Ojala et al., 2007); and associated with weight status and weight perception in 2010-2016 (e.g. Al Sabbah et al., 2010; Vander

Wal, 2011; Gonsalves, Hawk & Goodenow, 2014; Lee & Lee, 2016).

Based on this literature review, it can be concluded that the use of weight control behaviors by adolescent girls was quite similar. Although exercise was the most commonly reported weight control behavior of adolescent girls in the United States and other countries, such as Europe and Israel, Hong Kong, New Zealand and Korea, engagement in unhealthy and extreme weight control behaviors was also prevalent. The most common unhealthy weight control behaviors were skipping meals and fasting, whereas self-induced vomiting, using laxatives and taking diet pills were the most frequently reported extreme behaviors (e.g. Serdula et al., 1993; Neumark-Sztainer et al., 2003; Vander Wal, 2011; Mayer-Brown et al., 2016). For example, Neumark-Sztainer et al. (2003) reported that unhealthy and extreme weight control behaviors utilized by adolescent girls included eating very little food (44.9%), skipping meals (44.7%), fasting (18%), using food substitutes (9.6%), smoking more cigarettes (9.1%), self-induced vomiting (6.6%), taking diet pills (6.7%), using laxatives (1.7%) and using diuretics (1.6%).

## 5 CONCLUSIONS

The aim of the current review was to obtain a description of the prevalence of dieting or weight control behaviors among adolescent girls in the US and other Western and non-Western countries. Findings indicate that the prevalence of unhealthy

and extreme weight control behaviors among the adolescent girls in various countries is relatively high. This is very worrying because it can cause some negative consequences, such as an increased risk of obesity, lack of food intake and the development of clinical eating disorders. Therefore, recommendation for future research is conducting more research into the prevalence and risk factors of unhealthy weight control behaviors among adolescents in other countries, particularly non-Western countries, to give direction for the development of more effective prevention and intervention programs to overcome this problem.

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