THE EFFECTIVENESS OF PRIMARY PREVENTION
OF EATING DISORDERS

Chronic Diseases and Injuries

Chronic Disease Prevention

December 2001
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To determine the effectiveness of interventions included in the Mandatory Health Programs and Services Guidelines (MHPSG), the following systematic reviews and summary statements were completed and funded by the Public Health Research, Education and Development (PHRED) Program of the Public Health Branch, Ministry of Health and Long Term Care.

**Program Planning and Evaluation**

The Public Health Research, Education and Development (PHRED) Program of the Public Health Branch, Ministry Guidelines (MHPSRG), the following systematic reviews and summary statements were completed and funded by

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- Coalition effectiveness in heart health, tobacco use reduction and injury prevention | 1999 |
- Prevention of unintentional injuries in childhood and young adolescence | 1999 |
- Using school-based programs to reduce adolescent risk behaviour | 1999 |
- School-based curriculum suicide prevention programs for adolescents | 1999 |

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- The effectiveness of the health promoting schools approach and school-based health promotion interventions | 2001 |
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- Postpartum smoking relapse prevention strategies | 2000 |
- Smoking cessation during pregnancy | 1999 |
- Public health home visiting | 1999 |

**Child Health**

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Effectiveness of video for health education
Postpartum smoking relapse prevention strategies
Smoking cessation during pregnancy
Using school-based programs to reduce adolescent risk behaviours
Peer/paraprofessional 1:1 interventions
Effectiveness of parenting groups with professional involvement in improving parent and child health/development outcomes
Public health home visiting
Promotion of healthy feeding in infants under one year of age
School-based curriculum suicide prevention programs for adolescents

Completed reviews and summary statements are added to our web site as they become available. Please check http://www.city.hamilton.on.ca/sphs/CSARB/EPHPP/ephpp.htm regularly for new or updated information.

The conclusions of the reviews and summary statements are based on the available evidence. They do not necessarily represent the views of the Public Health Branch, Ministry of Health and Long Term Care. This report may be copied for circulation as appropriate. Please ensure that the PHRED Program, Public Health Branch, Ministry of Health and Long Term Care is acknowledged.
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PREFACE

Research is one component in evidence-based decision-making, along with past experience, patient preference and available resources. Making research results available to consumers, practitioners, policy-makers and other researchers is essential to fostering evidence-based practice and decision-making. In the Ontario Public Health, Health Promotion and Primary Care area, lack of access to research evidence can be a barrier to using research in policy and practice.1,2

The Public Health Branch of the Ministry of Health and Long Term Care and the City of Hamilton fund the Public Health Research, Education and Development (PHRED) Program in Hamilton. A similar program is in place in four other health units across the province. One role of the PHRED Program is to conduct and disseminate clinically relevant public health, health promotion and primary care research, and to foster evidence-based practice and policy-making.

The Effective Public Health Practice Project (EPHPP) is one initiative within the PHRED Program. This project involves public health researchers, practitioners, and policy-makers from across the province. The EPHPP project members conduct systematic reviews that evaluate the effectiveness of relevant interventions. This project, coordinated from the City of Hamilton PHRED, has produced numerous reviews and summary statements on the effectiveness of interventions for the Ministry of Health and Long Term Care, Public Health Branch. Work is ongoing.

Professional collaboration ensures high-quality scientific work that is clinically relevant to consumers, practitioners and policy-makers. Members of the PHRED Program located in each of the health units have links with faculties such as Health Sciences, Dentistry, Nursing, Nutrition, Medicine, Environmental Health and Geography at their local universities. The EPHPP also has links to the Cochrane Collaboration, an international research initiative, committed to summarizing and making the highest quality research available worldwide.

The EPHPP is committed to on-going consultation with health units within the province to define and review appropriate public health topics, and to collaboration with other groups equally committed to evidence-based practice and decision-making. In this way, the EPHPP continues to develop research which is timely, evidence-based, and relevant to the delivery of public health services in Ontario.

**Effectiveness of School-Based Strategies For Primary Prevention of Eating Disorders: A Systematic Review**

**Public Health Mandate**
Through the Mandatory Health Programs and Services Guidelines (1997), a goal of public health is prevention of chronic disease. Strategies are designed to increase awareness and knowledge, build skills and improve the social and physical environment in order to support healthy eating, healthy physical activity and positive self-esteem. Programming has been developed to address all areas of the weight spectrum, body image issues and disordered eating.

**Background**
Approximately 5% of women will develop a severe, debilitating and potentially fatal eating disorder. A much larger number suffer from inadequate nutrition, negative body and self-esteem as a result of trying to reduce their body size. A survey of adolescent girls in three Ontario cities reported 23% of participants were currently dieting to lose weight; further, 13% of girls 12-14 years and 15% of those 15-18 years, scored above the cut-off for disordered eating (Jones, Bennett, Olmsted, Lawson, & Rodin, 2001). Effective interventions are required for promoting healthy eating and exercise, and reducing the preoccupation with weight and size, and the resulting poor nutrition and exercise patterns.

**Issue**
Many programs, particularly school curricula have been developed in response to the high levels of disordered eating and exercise in young women. What is the effectiveness of various strategies for primary prevention of eating disorders?

**Finding the Answers**
A systematic review of published studies was completed. MEDLINE, CINAHL, ERIC, EMBASE, PsycINFO, the Cochrane Database and the York Database of Abstracts of Reviews of Effectiveness were searched from 1990 to April 2001. Several relevant journals were handsearched. Only English language articles were retrieved. To be included, the articles had to: evaluate an intervention for prevention of eating disorders; target pre-adolescent to young adults; and, be randomized, quasi-randomized or a cohort study.

**What is the Evidence?**
Thirty-six relevant articles were found. Seventeen studies were rated “moderate” or “strong” in the methodology, with outcomes measures of known reliability and validity. All 17 were school-based interventions. While all of the studies were aimed at prevention of eating disorders, all used outcome measures of knowledge, attitudes or behaviours that are associated with eating disorders, not
an actual clinical assessment or diagnosis of eating disorders. Interventions
directed to primary school children (versus high school), of at least nine weeks
duration, and targeted to healthy eating (versus discussion of signs, symptoms
and treatment of eating disorders), were more effective in increasing
knowledge, changing attitudes, decreasing the importance of social acceptance
in the short term, with diminishing effects as the length of follow-up increased.
Within this group of studies, programs specifically for healthy eating and
exercise show similar promise.

Implications for
Practice
• Interventions should not give information on signs, symptoms or treatment
  of eating disorders.
• Interventions should be targeted to grade 5 and above.
• Interventions of 9 weeks or more should be used.
• School teachers with adequate training and support from health department
  staff, can be used to deliver the intervention.

Implications for
Research
• Trials need to incorporate adequate sample sizes, with appropriate cluster
  analysis if the randomization is by school or class and the unit of analysis is
  by individuals.
• Interventions should be grounded in a clear theoretical basis.
• Booster sessions should be evaluated for impact on maintaining positive
  results for a longer period of time.
• “Healthy schools” and additional environmental support interventions should
  be evaluated.

Implications for
Policy
• Public Health Departments should partner with schools boards and
  researchers to develop, implement and fully evaluate any programs for
  healthy eating and primary prevention of eating disorders.
• Consideration should be given to the funding of “healthy school”
  interventions and their evaluation.
• Consideration should be given to the funding of community-wide
  interventions and their evaluation.

Source of
Information
Prevention of Eating Disorders. Prepared for the Effective Public Health Practice
Project for the Public Health Branch, Ontario Ministry of Heath.

Disordered eating attitudes and behaviors in teenaged girls: A school-based study.
CMAJ: Canadian Medical Association Journal, 165, 547-552.

Summarized By
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ABSTRACT

Objectives
One area of the Chronic Disease Prevention section of the Mandatory Health Programs and Services Guidelines (1997) is concerned with the delivery of strategies designed to increase awareness and knowledge, build skills and improve the social and physical environment in order to support healthy eating, healthy physical activity and positive self-esteem. Many programs, particularly school curricula have been developed in response to the high levels of disordered eating and body weight concern in young women. This systematic review sought to answer the question: What is the effectiveness of various strategies for primary prevention of eating disorders? Are there differences in outcome by age of the target group, site, intensity of the program, theoretical basis or preparation of the person who delivers the program?

Methods
A search was conducted of the following electronic databases from 1990 to April 2001: MEDLINE, CINAHL, ERIC, EMBASE, PsycINFO, the Cochrane Database and the York Database of Abstracts of Reviews of Effectiveness. Key journals related to eating disorders and to adolescent health handsearched for the same time period. Relevant references were retrieved from the bibliographies back to 1986. Each article was rated for relevance and validity by two independent readers then data abstraction was done for studies that rated strong or moderate. To be included, the articles had to evaluated an intervention for prevention of eating disorders, to target pre-adolescent to young adults, to be randomized, quasi-randomized or a cohort study.

Results
One hundred sixty-six articles were retrieved; thirty-six were relevant. Eighteen articles were rated as “weak”, sixteen articles were rated “moderate” or “strong” in the methodology, with outcomes measures of known reliability and validity. Within the sixteen articles actually described seventeen studies. All were school-based interventions.

While all of the studies were aimed at prevention of eating disorders, all used outcome measures of knowledge, attitudes or behaviours that are associated with eating disorders, not an actual clinical assessment an diagnosis of eating disorders. Interventions directed to primary school children (versus high school), of at least nine weeks duration, and targeted to healthy eating (versus discussion of signs, symptoms and treatment of eating disorders), were more effective in increasing knowledge, changing attitudes, decreasing the importance of social acceptance in the short term, and occasionally reduced binge eating and dieting behaviours, with diminishing effects as the length of follow-up increased. Within this group of studies, programs specifically for healthy eating and exercise show similar promise.

Conclusions
School curricula can have at least a short-term positive effect on increasing knowledge, changing attitudes and decreasing some behaviours that are associated with eating disorders. Interventions need to be tested that include booster sessions, more environmental support, “healthy schools” approach or community-wide interventions.
BACKGROUND

Introduction

In Ontario, the 1997 Mandatory Health Programs and Services Guidelines (Ministry of Health of Ontario Public Health Branch, 1997) specify the responsibilities of public health units in chronic disease prevention. Health units are required to implement multiple strategies to reduce the risk of many chronic diseases through achieving and maintaining healthy weight, healthy eating, and moderate physical activity. Strategies are to be designed to increase awareness and knowledge, build skills and improve the social and physical environment to support healthy eating, healthy physical activity and positive self-esteem. Schools are considered appropriate intervention sites to reach target child and youth audiences. Many public health workers are developing and/or delivering programs regarding healthy weights. Public health concerns about overweight and obesity need to be tempered by concerns about increases in unhealthy weight control practices and eating and exercise disorders.

Clinical eating disorders are primarily anorexia nervosa and bulimia nervosa. About 5% of women will develop a severe, debilitating and potentially fatal eating disorder (Goldbloom & Garfinkel, 1993). Anorexia nervosa is characterized by having a body weight 85% of medical ideal or less, accompanied by fear of weight gain, body image disturbance and amenorrhea. Bulimia nervosa involves recurring episodes of binge eating accompanied by compensatory mechanisms, and self-esteem significantly influenced by weight and shape (American Psychiatric Association, 1994). Other types of disorders, or partial syndromes, that do not meet criteria for anorexia or bulimia, such as binge eat disorder, are classified as “eating disorder – not otherwise specified” (American Psychiatric Association, 1994) and are two to five times more common than full diagnoses in adolescent girls (Mussell, Binford, & Fulkerson, 2000). Documented complications include: menstrual irregularities (estrogen deficiency), abnormal thyroid functioning, elevated growth hormone levels, renal complications, anemia, leukopenia, decreased cardiac chamber size, thinning of the left ventricle, electrolyte disturbance (such as hypokalemia, which may lead to cardiac arrest), gastric dilation or rupture, parotid gland enlargement, and dental enamel erosion (Shisslak, Crago, & Neal, 1987).

A recent prognosis study is the longest follow-up achieved to date. Lowe and colleagues followed 84 women with a diagnosis of anorexia nervosa, and managed to achieve 90% follow-up at 21 years after initial treatment (Lowe et al., 2001). They found that 20.8% of the sample were only partially recovered and another 26% had poor outcomes, including 14 (16.7%) who had died. Twelve of the 14 women had died of causes directly related to anorexia nervosa and met full criteria for anorexia nervosa at the time of death (Lowe et al., 2001); the observed death rate was 9.8 times greater than the expected mortality rate (Lowe et al., 2001). Furthermore, among those who were alive at 21 year follow-up, 17.5% met diagnostic criteria for depression, 15.9% met criteria for anxiety disorder, 11.1% were diagnosed with substance related disorders, 6.4% met criteria for personality disorders, and 6.4% met criteria for obsessive-compulsive disorder (Lowe et al., 2001). The costs of eating disorders, in terms of mortality, morbidity, quality of life and productivity are very high.

However, eating disorders “represent only one extreme of a broad spectrum of disordered eating” (Rosen & Neumark-Sztainer, 1998) [pg 354], which is often conceptualized as a continuum (Figure 1). The risks associated with dieting or partial syndrome include compromised growth and development, consequences of dangerous weight loss strategies (such as vomiting, use of diuretics or laxatives), psychological distress, psychiatric co-morbidity and progression to eating disorders (Rosen et al., 1998). Dieting has been considered to be a
risk factor for the development of severe forms of eating problems (Bennet & Gurin, 1982; Polivy & Herman, 1983). In a 2001 study (Jones et al., 2001), participants who were currently on a diet were 3.3 times more likely to report binge eating than girls who were not dieting and 5.7 times more likely to report purging. Over the age of 15 years, female adolescents who were dieting had a higher probability of developing an eating problem than their non-dieting counterparts (Hill & Robinson, 1991).

Risk Factors

Healthy Eater ← Typical Dieter ← Pathological Dieter ← Partial Syndrome ← Eating Disorder

Protective Factors

Figure 1. The continuum of eating and weight-related behaviours (Rosen et al., 1998)

The conceptualization of the continuum has led to increased concerns about children’s and adolescents’ perceptions and attitudes towards their bodies and food (Canadian Teacher’s Federation, 1990; Day, 1990; Hill et al., 1991). One study found that 40% of grade 3 girls and 80% of grade 6 girls were preoccupied with food and weight issues, while 30% of grade 1 girls and 60% of grade 4 girls were dieting (Michaud & Terry, 1993). Maloney and colleagues (Maloney, McGuire, & Daniels, 1988) surveyed children in grades 3 to 6 and found that 7% scored in the anorexia nervosa range. Nearly 80% of 10 year old girls were on weight-reducing diets (Mellin, Irwin, & Scully, 1992). A study of 1739 females in Toronto, Hamilton and Ottawa reported that 23% of participants were currently dieting to lose weight, and 13% of girls 12-14 years and 15% of those 15-18 years scored above the cut-off for disordered eating (Jones et al., 2001). Another survey of 363 grade 7 and 8 girls in urban Central Ontario found that 61.5% responded “yes” to a question about current dieting (McVey, Pepler, Davis, Flett, & Abdolell, 2002).

Low self-esteem and negative body image have been identified as influences in the progression along the eating disorder continuum. A high proportion of female adolescents have low self-esteem and poor body image (Rosen J.C. & Gross, 1987). Fifty per cent of female adolescents are on weight-reducing diets because they perceive themselves to be fat (Day, 1990). The Canadian Teachers Federation found that 80% of adolescents are concerned about their weight, shape and size (Canadian Teacher’s Federation, 1990). However, these are only some of the risk factors for the development of eating disorders. A comprehensive model that integrates many personal, socioenvironmental and behavioural factors is shown in Figure 2 (Rosen et al., 1998). The model indicates that multiple factors interact to move someone from pervasive weight concerns to pathological weight control behaviours and on to develop eating disorders. A recent review of risk factors identified that the development of eating disorders could be conceptualized in terms of interactions among a unique combination of variables. Yet some risk factors are particularly important. For example, the thin ideal is pervasive in the media; individuals who internalize the thin ideal are more likely to exhibit body dissatisfaction. When the importance of thinness is reinforced through messages from adults or peers, the likelihood of disordered eating increases (Mussell et al., 2000).
The increasing prevalence of disordered eating in children and adolescents has led to a call for primary prevention interventions (Battle & Brownell, 1996; Mussell et al., 2000; Shisslak et al., 1987; Crisp, 1979; Crisp, 1988). Programs are required to prevent the onset of disordered eating, reduce the effect of existing attitudes and behaviours related to eating disorders, and foster healthier knowledge, attitudes and behaviours to promote psychological and physical well-being (Neumark-Sztainer, Butler, & Palti, 1995). While Figure 2 describes etiologic factors, it also gives direction for possible prevention interventions, that may be aimed at reducing body dissatisfaction (understanding factors associated with body dissatisfaction, introducing positive self-thoughts), promoting critical thinking about sociocultural and peer influences, increasing understanding about normal physical development (such as fat accumulation in adolescent girls), improving knowledge about nutrition and weight control, and developing skills in food selection, physical activity and dealing with peer and social pressures (Rosen et al., 1998).

Researchers and theorists have advocated primarily for the establishment of an eating disorder curriculum that could be administered by educators (Levine, 1987; Shisslak et al., 1987) and public health nurses (Chitty, 1991) in the context of the educational system. Some theorists have identified specific content areas for school-based programmes for prevention of eating disorders (Shisslak et al., 1987; Crisp, 1988; Levine, 1987; Rosen J.C., 1989; Smolak, Levine, & Schermer, 1998a; Smolak, Levine, & Schermer, 1998b). Low self-esteem, body image dissatisfaction, dieting, and other weight loss behaviours are risk factors that could be targeted to curtail the increasing prevalence of eating disorders in adolescents (Paxton, 1993). Scholars

**Figure 2.** A theoretical model of eating and weight-related behaviours (Rosen et al., 1998)
have suggested that a preventative curriculum for eating disorders should include information about the myth of the ideal body type, weightism (discrimination based on body size) and healthy eating (Rice, 1993; Shisslak & Crago, 1994; Steiner-Adair, 1994). In response to these recommendations, some scholars have begun to evaluate the effectiveness of primary and secondary prevention programmes.

**Review Question**

In Ontario, many curricula have been implemented regarding body image, self-esteem and weight pre-occupation, with the ultimate goal of preventing disordered eating. Public health personnel and teachers need to implement programs that will result in more good than harm, reduce the incidence of eating disorders and thereby, improve the health of our population. Narrative reviews on the topic have been done, but none have been systematic reviews. Some reviews present theoretical frameworks for the development of prevention programs (Rosen et al., 1998) and others suggest intervention components (Crisp, 1988; Neumark-Sztainer, 1996) or research directions (Barr Taylor & Altman, 1997). There are few intervention studies. Shisslak and colleagues (Shisslak, Crago, Renger, & Clark-Wagner, 1998) looked at the relationship between self-esteem and prevention of eating disorders and presented studies of direct and indirect interventions for improving self-esteem. Stewart (Stewart, 1998) reviewed six published studies of school-based interventions on the basis of goals, content, technique, number of sessions, subjects and outcomes, but did not critically evaluate the methodologic quality of the studies.

This review examines the question

*What is the effectiveness of various strategies for primary prevention of eating disorders?*

Interventions aimed at primary prevention of eating disorders were included in this review. The search was not restricted to curriculum interventions, but aimed to identify any intervention that might be done within public health practice. Reviewers looked for differences in outcome by intervention type, intensity, theoretical basis, target group age, risk status, and level of training or professional status of the person(s) delivering the intervention.

Outcomes such as disturbances in eating, body satisfaction, and attitudes toward weight, shape and food are often used in this literature, as the nature of research funding often does not allow for large enough sample sizes or adequate follow-up to assess actual development of clinical eating disorders. This review did not answer etiologic questions about risk factors for development of eating disorders, prognosis, outcomes of eating disorders or treatment programs or their effectiveness.

**METHODS**

**Search Strategy**

The research team identified possible search terms. Recurrent words in the titles and abstracts of relevant articles were identified. Keyword indexing of important citations were reviewed. Search terms included eating disorders, anorexia, bulimia, binge, overeating, disturbed eating, exercise disorder, evaluation, effectiveness; education, media, counselling, community-based, nutrition, health promotion, school, prevention, knowledge, attitudes, behavioural, body image, disturbed eating, and self-esteem. Two librarians independently planned the searches, ran trial searches, and met to come to a consensus about the final strategies. One librarian then completed all electronic searches. (See Appendix A for the full list of search terms).
Databases were searched from 1990 to April 2001 and included: MEDLINE; CINAHL (Cumulative Index of Nursing and Allied Health Literature), ERIC (Educational Resources Information Center), EMBASE (Excerpta Medica), PsycINFO, The Cochrane Database of Systematic Reviews, the Cochrane Controlled Trials Register, and the York Database of Abstracts of Reviews of Effectiveness. Titles and abstracts of articles were downloaded where possible. Two team members independently reviewed the output. All English-language articles selected by either team member were retrieved.


Reference lists of each article were checked and other articles that appeared appropriate to the review were retrieved back to 1986. Studies from the “grey” or “fugitive” literature (industry, government or other reports not published in scholarly journals) were sought from several sources including various international eating disorder associations and computer web sites relevant to nutrition, body image and eating disorders.

**Review Procedures**

All retrieved articles were entered into a Reference Manager database. Two team members independently read and rated the articles for relevance. Studies were considered to be relevant if they assessed interventions for primary prevention of eating disorders that fit within the 1997 Ontario Provincial Mandatory Health Programs and Services Guidelines (Ministry of Health of Ontario Public Health Branch, 1997), participants were preadolescent age (9 years and older), outcomes included knowledge, attitudes, behavioural intention or behaviour; and the design included a control group (see Appendix B). Thus, we were specifically looking for outcome evaluation of interventions that would be of relevance to policy and practice in Ontario. Although we were aware that several uncontrolled studies existed, we chose to restrict this review to controlled studies so that we could have higher confidence in the results.

For all articles rated as relevant, the validity (quality) of the studies was independently assessed by two readers based on selection bias, study design, confounders, blinding, data collection methods and handling of withdrawals and dropouts (see Appendix C). Study quality for each criterion was rated as strong, moderate or weak, and then a global rating (strong, moderate or weak) for the paper was assigned. A study was rated as ‘strong’ if it had no weak ratings and four of six strong ratings; it was rated ‘moderate’ if it had one weak rating; and it was rated ‘weak’ if it had two or more weak ratings. Two readers independently abstracted data using a data abstraction form (see Appendix D).
RESULTS

Retrieval and Ratings

Five hundred forty-four citations remained after the results of all database searches were combined, and duplicates were removed. Most of these citations appeared to be correlational studies of risks or treatment studies, which were not the focus of this review. One hundred seventy-two articles were ordered for retrieval. One hundred sixty-six were actually retrieved; five were not available as cited and alternate citations could not be found; one was still on order through inter-library loan at the time of writing this report. Of the 166 articles retrieved, 36 were relevant and 130 were not relevant to this review. Many of the studies rated as not relevant were reports of correlation studies of risk factors associated with eating disorders. Others were treatment evaluations or theoretical pieces. Of the 36 relevant articles, 18 were rated as weak (Appendix E), 13 were rated as moderate and three were rated as strong. Two other publications each contributed information about the same project that was already included in the 36 relevant articles. In addition, one of the moderate articles actually reported on two distinct studies. Therefore, 17 strong or moderate studies included in the review with 18 distinct references. Nine of these were randomized trials.

The most common methodologic weakness was lack of blinding, followed by lack of control for confounders, especially in the cohort analytic studies. The strong and moderate studies used outcome measures of known reliability and validity. However, in most studies, allocation to groups was done by classes or schools, whereas outcomes were measured on an individual basis. Only one study accounted for this problem through cluster analysis. A group of classic early studies of interventions failed relevance criteria, as they had no control group (before/after studies) (Appendix F).

Content of the Articles

Of the 17 studies, 11 were conducted in the United States (Abood & Black, 2000; Killen et al., 1993; Killen, 1996; Smolak et al., 1998a; Smolak et al., 1998b; Martz & Bazzini, 1999; Zabinski et al., 2001; Fisher & Thompson, 1994; Stice, Chase, Stormer, & Appel, 2001; Stice, Mazotti, Weibel, & Agras, 2000; Mann et al., 1997), 2 in Australia (O’Dea & Abraham, 2000; Paxton, 1993), one in Switzerland (Buddeberg-Fischer & Reed, 2001; Buddeberg-Fischer, Gnam, Klaghofer, & Buddeberg, 1998), one in Spain (Raich, Soler, & Mora, 1995), one in the United Kingdom (Stewart, Carter, Drinkwater, Hainsworth, & Fairburn, 2001) and one in Israel (Neumark-Sztainer et al., 1995). Five studies focused on groups that could be considered “at risk” for disordered eating. The participants of the studies did not meet criteria for eating disorders, but had high scores on some measure of body image disturbance (Stice et al., 2000; Zabinski et al., 2001; Raich et al., 1995; Fisher et al., 1994) or eating attitude (scores similar to those with sub-clinical eating disturbances) (Buddeberg-Fischer et al., 2001; Buddeberg-Fischer et al., 1998). All studies were initiated in a school setting and all used a group-based curricula or workshop format except for one, which was an Internet-based intervention with an on-line support group (Zabinski et al., 2001). There were no studies of environmental support. Four studies were targeted to primary school grades 4 to 8 (Killen et al., 1993; Killen, 1996; O’Dea et al., 2000; Smolak et al., 1998b; Smolak et al., 1998a), four studies to secondary schools (Buddeberg-Fischer et al., 2001; Buddeberg-Fischer et al., 1998; Neumark-Sztainer et al., 1995; Paxton, 1993; Stewart et al., 2001), and nine to college levels (Abood et al., 2000; Fisher et al., 1994; Mann et al., 1997; Martz et al., 1999; Raich et al., 1995; Stice et al., 2001; Stice et al.,
2000; Zabinski et al., 2001). The 17 studies will be described by target groups. Further details of each study are found in Table 1.

**Interventions For Primary School Students**

All four studies of interventions within this age group were curricula of 9-18 sessions. Smolak, Levine and Scherman completed two studies of the same intervention, with two different age groups. Both were cohort analytic studies, the first with boys and girls in grade 4 (Smolak et al., 1998b) and the second with boys and girls in grade 5 (Smolak et al., 1998a). Both evaluated the effectiveness of a 10-session curriculum entitled, “Eating Smart, Eating for Me”. The program was designed to encourage healthy eating, exercise, and body image, while discouraging calorie-restrictive dieting, exercising for weight loss, and the development of body image dissatisfaction. The theoretical framework of the curriculum was not stated. Parental involvement was elicited through newsletters and homework activities. In both studies, teachers delivered the program after a two-hour training session. There was no measure of how many sessions were actually given, or how closely the teachers followed the curriculum. There was also a possibility of contamination as the intervention and control participants were sometimes in the same school. Confounders were not well controlled as different classes in different schools were used, and they were not randomly allocated.

For the 11 grade 4 classes (309 students) (Smolak et al., 1998b), follow-up occurred at the end of the ten-week intervention. The intervention group had improved knowledge scores regarding the need to eat a variety of foods. Total fruit and vegetable consumption, exercise, teasing of others about weight and shape and weight loss attempts did not change. Oddly, gender sub-analysis revealed that boys in the intervention group and girls in the control group had significantly improved body esteem. Again, this may have been related to teachers not giving the curriculum or lack of control of confounders. In the grade 5 study (222 students) (Smolak et al., 1998a), follow-up was at four months after the ten-week intervention ended. The curriculum helped to improve students’ knowledge about nutrition, effects of dieting, and causes of body fat accumulation. However, behaviour, including eating patterns, exercise patterns, weight reduction attempts, and teasing of overweight children was not changed by participation in the curriculum. One encouraging finding was that the curriculum did positively affect the students' attitudes about overweight people.

Killen randomized classes within schools and grades 6 and 7 (967 students, all female) (Killen et al., 1993; Killen, 1996). Classroom teachers delivered the curriculum 50 minutes/week for 18 weeks. Class content was based on Bandura’s social-cognitive theory, and comprised eighteen lesson plans which were divided up into three sections: (1) the limitations of dietary practices; (2) the benefits of healthy eating and moderate exercise on adolescent physiological development; (3) and coping strategies to mitigate the adverse effects of socio-cultural influences. Moreover, recipients of the intervention received information about the normal biological changes (weight gain and menarche) that accompany pubertal development in females. This intervention resulted in significant improvement in knowledge (on a tool that measured all three areas identified above), but no changes in eating attitudes. Analysis of participants who were available at pre- and post-assessment and at least one of 7, 14 or 24 months, showed no significant differences on any measures. Secondary analysis of girls considered at "high risk" (scored over 57 on weight concerns scale) showed a significant increase in knowledge for girls in the intervention group compared with those in the control group. Actual numbers of participants who were assessed on various outcomes at various times are not given in either publication.
“Everybody’s Different” is a nine-session curriculum, taught by teachers once a week for 50-80 minutes (O’Dea et al., 2000). O’Dea tested the intervention with grades 7 and 8 classes (470 children) that were randomized to the intervention or control. The curriculum was active, in that students were expected to participate in plays, drama and group work designed to promote positive self-esteem and a positive environment and to develop skills for dealing with stress, resisting stereotypes, and improving both communication and relationship skills. In the short-term, the intervention group had significantly lower body dissatisfaction, drive for thinness, belief in the importance of physical appearance, and importance of social acceptance, than the control group. At 12 month follow-up, the importance of social acceptance had significantly decreased for the intervention group and had increased for the control group. All other measures were no longer statistically different. Unlike most of the other 17 studies, both teachers and students were blind to the real purpose of this study. Analysis of the high-risk sub-group showed that the intervention had a significant effect on reducing body dissatisfaction, increasing the perceived importance of close friendships, and decreasing the perceived importance of social acceptance and physical appearance.

Interventions for Secondary School Students

Paxton used a cohort analytic design to evaluate a five-week curriculum. The program aimed to prevent the occurrence of body image disparagement and dieting and disordered eating in adolescent girls (Paxton, 1993). The researcher taught the program to 136 grade 9 students in three private secondary schools in Australia. The intervention addressed the following topics: (1) the influence of the mass media and diet and the fashion industries on adolescents’ body image and self-image; (2) biological determinants of body weight and the social and psychological influences on eating; (3) nutritional problems; 4) health risks of dieting and appropriate weight loss methods; (5) and physical needs, emotional eating and disordered eating patterns. The pre- and post-test results revealed that the intervention did not have a significant effect on students perceptions and attitudes towards their bodies and food, or on weight-control behaviours. There were no statistically significant between-group or within-group differences in body dissatisfaction, although all groups had a trend towards increasing body dissatisfaction over the one year follow-up.

Neumark-Sztainer and colleagues examined the short- and long-term implications of a school-based prevention program for eating disorders for 341 adolescent girls in Jerusalem, called “Weight to Eat” (Neumark-Sztainer et al., 1995). The study was a cohort analytic design, which allocated some classes in one school to the intervention and some classes in another school to the control, while classes in a third school were randomly assigned to intervention or control. Using a social-cognitive framework, the 10-lesson intervention aimed to modify cognitive distortions that may influence adolescent girls’ eating behaviours and body image. The intervention attempted to provide adolescent girls with the cognitive tools to cope with or resist pressures to diet from their peers, families and teachers. At six-month follow-up, the girls in the intervention group had better nutrition knowledge scores, more regular meal patterns and exercised more frequently than those in the control group. They also successfully delayed the onset of binging and use of unhealthy weight loss methods (in girls who reported not engaging in such behaviours at pre-test). At two-year follow-up, only the latter difference was maintained. Other sub-group analyses revealed that “overweight” adolescent girls who received the intervention were less likely to engage in dieting and binging behaviours than thin and "overweight" girls in the control groups.

Using a cohort analytic design, Stewart studied 845 year nine students in six different girls schools in the United Kingdom (Stewart et al., 2001). Forty-five minute sessions were held
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once a week for six weeks. The curriculum was based on cognitive-behavioural interventions used to treat people with eating disorders, as well as a developmental framework. It focused on adjustment to puberty, how eating disorders develop within socio-cultural pressures to be thin, and other critical issues such as body image dissatisfaction, self-esteem and dieting. Immediately post-intervention, the intervention group had significantly lower restraint scores and higher knowledge scores than the control group. No differences remained statistically significant at six-month follow-up. In considering the differential effect of the intervention based on risk status, the intervention significantly reduced restraint in dieters.

The least intensive intervention for secondary school students involved three, 90-minute sessions given once per month (Buddeberg-Fischer et al., 2001; Buddeberg-Fischer et al., 1998). This study took place in Switzerland. Just under 2000 adolescents were screened using the Eating Attitudes Scale (EAT). The 20 classes with the highest proportion of students scoring over ten (considered a measure of sub-clinical eating disturbance) were randomized to intervention or control. The curriculum considered gender differences in maturation and body awareness, the beauty ideal in our society, early symptoms of eating disorders and treatment options. At 12-week follow-up, the groups did not significantly differ for eating attitudes, overall distress or general symptom index, although scores were reduced in both groups. Sub-group analysis revealed that those with the highest scores on the EAT had significant reductions after the intervention, indicating that the program was more effective for those at most risk.

Interventions For Post-Secondary Students

Three studies assessed one time-only interventions, 60-90 minutes in duration (Martz et al., 1999; Mann et al., 1997). Martz presents two of these studies in one publication (Martz et al., 1999). Both interventions were based on a psycho-education model focusing on healthy eating, exercise, body image, media influence, and symptoms and causes of eating disorders. Study 1 was delivered by a peer educator, and at 4-week follow-up, participants in the intervention group showed statistically significant improvements in body esteem and reduced dieting. However, the author indicated that these differences were unlikely to be clinically meaningful (differences of 4 points on the dieting scale and 0.2 points on the body dissatisfaction scale). Study 2 was delivered by the author and included more emotionally persuasive content, relaxation and guided imagery. This study showed a statistically significant reduction in dieting behaviours and a reduction in body esteem in the intervention group. Again, the author indicated that these differences were unlikely to be clinically meaningful (0.9 points on the dieting scale and 0.5 points on the body dissatisfaction scale).

Mann and colleagues set out to do primary and secondary prevention together in one intervention (Mann et al., 1997). They used a Solomon four group design with a total of 344 college females, (actual numbers for each group could not be discerned from the publication). Content focused on the prevalence, symptoms, consequences, treatment and prognosis of eating disorders. Two peers who had recovered from eating disorders taught the material in one 90-minute session. At 12 week follow-up, the intervention group had a significant increase in symptoms compared with the control group. There were no other significant differences between groups on weight satisfaction or self-esteem. The authors postulate that this intervention “normalized” eating disorders and reduced the associated stigma, allowing participants to more freely express their true behaviours on the outcome measures, and to participate in behaviours they may have avoided before the intervention.

Stice evaluated two dissonance-based interventions where participants argued against the thin ideal through role playing (Stice et al., 2001; Stice et al., 2000). Other content included critical
analysis of thinness and costs/benefits of the pursuit of thinness. The first study included 30 female undergraduate students who had elevated self-reported body image concerns (Stice et al., 2000). Stice allocated ten undergraduate females to the intervention group and 20 to a waitlist control and conducted the intervention over three weekly one-hour sessions. At four-week follow-up, intervention participants had improvements over the control group in thin-ideal internalization, body dissatisfaction and bulimic symptoms. There were no differences in dieting behaviours or negative affect. The control group had a significant increase in bulimia symptoms.

In a second study of 87 college females, Stice compared the same dissonance-based intervention with a healthy weight management control, expecting this to be an inactive intervention (Stice et al., 2001). Both were taught in three sessions, once per week. The healthy weight maintenance control included a balanced diet, moderate exercise, low-fat eating, and diet and exercise monitoring. At four-week follow-up, the intervention group had significant improvements over the healthy weight control group on thin-ideal internalization only. Both groups showed similar reductions in body dissatisfaction, bulimic symptoms and dieting behaviours, indicating that the control group may have been a more active intervention than anticipated.

Abood randomized 70 female college athletes from different sports to an educational workshop or control (Abood et al., 2000). The workshop, not part of the usual school curriculum, was delivered by the author in eight one-hour sessions. The workshop focused on body image, self-esteem, caloric and nutrition needs of athletes, beliefs and myths about dieting and athletics, goal setting, and sessions on correcting distorted thoughts. The latter content appears to be from a cognitive-behavioural perspective, although no theoretical basis was named in the article. At immediate post-test, the intervention group had significant reductions in body dissatisfaction and drive for thinness compared with the control group. The control group experienced a decline in nutrition knowledge and self-esteem over the eight weeks. No differences were found in self-rated anxiety or sport competition anxiety. There was a high retention rate, with 96% of all athletes in the intervention group completing all eight sessions.

The last three studies that were rated as strong or moderate included college women who were considered “at risk” in some way (Fisher et al., 1994; Raich et al., 1995; Zabinski et al., 2001). The first was a pilot study with a very small sample of 11 students in the intervention group and six in the control group. It was conducted in Spain (Raich et al., 1995) and included students who scored above 105 on the Body Shape Questionnaire, which indicates body dysmorphic disorder. The eight-week intervention was based on a cognitive-behavioural intervention and included monitoring, desensitization, and rehearsal of positive self statements. There were no significant findings, as one would expect from such a small sample size.

Fisher screened 500 undergraduate females for low appearance evaluation and excluded those with eating disorders (Fisher et al., 1994). He randomized 16 women to a cognitive-behavioural intervention, 14 to an exercise intervention and 16 to a wait-list control. The cognitive-behavioural intervention was given in one-hour weekly sessions for six weeks and included mirror and video desensitization, relaxation, self-monitoring and cognitive restructuring. The exercise intervention consisted of one-hour weekly sessions for six weeks of both aerobic and weight-lifting activity with instruction to do the routine twice a week as homework. At post-intervention, both intervention groups showed a significant reduction in weight anxiety and body dissatisfaction compared with the control group. The authors, however, caution against the use of an exercise program, as exercise is often done for the purpose of weight loss, rather than fitness. The weight-loss association may contribute to a feeling that one’s body is not the right size, and inadvertently validate some women’s body disparagement.
Zabinski developed one of the most innovative interventions that used a computer software program called “Student Bodies” (Zabinski et al., 2001). Sixty-two females who scored above 110 on the Body Shape Questionnaire (considered by the author to be indicative of risk for development of eating disorders) were randomized to the intervention or control group. The intervention lasted eight weeks and was based on a psycho-education model. Participants were expected to attend at least one weekly lesson, and to post one to two messages on an electronic bulletin board set up only for the intervention group and monitored by a psychology graduate student. A research assistant telephoned the intervention group weekly to remind them to use the software program, and called the control group every four weeks to remind them of the next assessment. Women in the intervention group read an average of 80% of the assigned web pages and 70% posted the required number of messages to the bulletin board. At ten-week follow-up no significant differences were found. All outcomes (drive for thinness, body shape questionnaire, weight and shape concerns, eating and restraint) had improved in both groups. The author postulated that because participants were chosen on the basis of high scores, improvement in both groups might be attributed to regression to the mean. The study was also hampered by the small sample size. Participants rated a high level of support and ability to talk about concerns on the electronic bulletin board.

Interventions Specifically for Healthy Eating

More recent emphasis has shifted from presentations about eating disorders, to “healthy eating”. While most of the curricula described in this literature could be relevant to the development of a healthy eating program, some were targeted specifically to healthy eating and activity (Killen et al., 1993; Killen, 1996; Neumark-Sztainer et al., 1995; Smolak et al., 1998b; Smolak et al., 1998a; Martz et al., 1999; Stice et al., 2001); one study dealt with healthy eating, but did not include activity (Buddeberg-Fischer et al., 2001). These interventions, discussed by age groups above and by other comparisons following, are difficult to compare given the diversity of age groups and the varying intensity of the interventions. However, the most common finding was a statistically significant difference in knowledge between the intervention and the control groups (Killen et al., 1993; Neumark-Sztainer et al., 1995; Killen, 1996; Smolak et al., 1998a; Smolak et al., 1998b); this effect was mostly short-term (immediate post-intervention or up to six months) and was not maintained at one year. Other significant findings were that the intervention group had more frequent exercise and regular meal patterns at six months, behaviours that were not maintained at two years (Neumark-Sztainer et al., 1995); improvements in body dissatisfaction and reduced importance of physical appearance immediately after the intervention but not at 1 year, and reduced importance of social acceptance (popularity, peer group acceptability) (O’Dea et al., 2000); short-term reductions in dieting and improved body esteem (Martz et al., 1999), and improved thin-ideal internalization (Stice et al., 2001). Thus, the healthy eating interventions are promising, but to date, have shown predominately short-term effects.

Other Comparisons

Intervention Intensity

Intervention intensity varied from a single one-hour session to 18 fifty-minute sessions. Three studies of one-hour interventions (Martz et al., 1999; Mann et al., 1997) had outcomes opposite to what was expected: they showed a statistically significant increase in symptoms (Mann et al., 1997) and a reduction in body esteem (Martz et al., 1999). However, the content of all three interventions focused primarily on eating disorders. Stice conducted two trials of a three-session intervention with positive short-term outcomes of reduction in thin-ideal internalization, body
dissatisfaction and bulimic symptoms (Stice et al., 2001; Stice et al., 2000). The intervention of the same intensity conducted with secondary school students in Switzerland had no effect on any measures except in the high-risk group (Buddeberg-Fischer et al., 2001; Buddeberg-Fischer et al., 1998). Interventions lasting five weeks (once/week) had mixed results: no significant differences (Paxton, 1993), an improvement in restraint and knowledge scores in the intervention group (Stewart et al., 2001), and less weight anxiety (Fisher et al., 1994). Eight-week interventions were done in three studies: one with female college athletes showed a decrease in body dissatisfaction and drive for thinness in the intervention group (Aboud et al., 2000); the Internet and electronic bulletin board intervention for college women “at risk” for eating disorders, which showed no differences (equal improvements in the intervention and control group); and one for “at-risk” college females which had no significant effect.

Four studies assessed interventions of nine or ten weeks (O'Dea et al., 2000; Smolak et al., 1998a; Neumark-Sztainer et al., 1995; Smolak et al., 1998b). These interventions significantly improved knowledge of nutrition (Smolak et al., 1998a; Neumark-Sztainer et al., 1995; Smolak et al., 1998b), and reduced body dissatisfaction (O'Dea et al., 2000), drive for thinness (O'Dea et al., 2000), and importance of physical appearance and social acceptance (O'Dea et al., 2000), negative attitudes to overweight people (Smolak et al., 1998a) and binge eating in a low-risk group (Neumark-Sztainer et al., 1995). Finally, an 18-week intervention showed improved knowledge about healthy eating, healthy exercise and dangerous weight loss practices in the intervention group, particularly in the high-risk group (Killen et al., 1993; Killen, 1996).

“High-Risk” groups
Several characteristics were identified by various researchers as indicative of risk. Some of the studies set out to test interventions for women considered to be “at risk”, whereas others did sub-analyses of various risk measures. In the primary school interventions, Killen did some secondary analyses of girls who scored over 57 on a weight concerns scale and found significant increases in knowledge in the intervention group over high-risk girls in the control group (Killen et al., 1993; Killen, 1996). O'Dea further analyzed the sub-group with low self-esteem and high anxiety. Within that sub-group, the intervention had a significant effect on reducing body dissatisfaction, increasing perceived importance of close friendships, and decreasing importance of social acceptance and physical appearance, even at one-year follow-up (O'Dea et al., 2000).

Among secondary school females, Neumark-Sztainer found that the sub-group of overweight girls was less likely to report dieting, binge eating and unhealthy weight-loss methods after intervention than overweight controls (Neumark-Sztainer et al., 1995). Similarly, Buddeberg-Fisher found that participants with the highest scores on the EAT had significant reductions after the intervention, indicating that the program was more effective for those at highest risk (Buddeberg-Fischer et al., 2001; Buddeberg-Fischer et al., 1998). Stewart’s intervention had a significant effect on reducing restraint in dieters (Stewart et al., 2001).

In “at-risk” groups, Fisher’s cognitive-behavioural intervention and exercise intervention were equally effective in reducing weight anxiety and body dissatisfaction (Fisher et al., 1994). However, this was based on post-intervention assessment only, without longer follow-up. Similarly, Stice found that the intervention group improved over the control group in thin-ideal internalization, body dissatisfaction and bulimic symptoms, but this follow-up was at only 4 weeks (Stice et al., 2000). Zabinsky (Zabinski et al., 2001) and Raich (Raich et al., 1995) found no effect on women as a result of their participation in the intervention. Both studies had small sample sizes.
Theoretical Basis

Of the 17 strong or moderate articles included in this review, only eight indicated theoretical basis for the development of the intervention. Therefore, it was difficult to compare the outcomes of the various interventions by theoretical models. Interventions tested by Killen (Killen et al., 1993; Killen, 1996) and Neumark-Sztainer (Neumark-Sztainer et al., 1995) were based on a social-cognitive model. Killen’s intervention with grade 6 and 7 girls resulted in knowledge improvement at 18-week follow-up (Killen et al., 1993), (Killen, 1996) while Neumark-Sztainer’s study with grade 10 girls found short-term knowledge improvements, more regular meal and exercise patterns, but no long-term changes except in the analysis of high-risk subgroups.

The studies by Stewart (Stewart et al., 2001), Fisher (Fisher et al., 1994) and Raich were all based on the cognitive-behavioural model, most often used in the treatment of eating disorders. The latter two studies, which had small sample sizes, showed no differences between intervention and control groups whereas Stewart showed a positive effect of the intervention on restraint and knowledge scores (Stewart et al., 2001). Zabinsky’s computer software program, based on a psycho-education model, showed no significant differences between intervention and control in women who had high scores on body dissatisfaction; both groups improved equally (Zabinski et al., 2001).

Stice evaluated a dissonance-based intervention in general college women that resulted in an improvement over controls only in thin-ideal internalization (Stice et al., 2001). In a body-image concerned group, the same intervention showed improvements over the control group in thin-ideal internalization, body dissatisfaction and bulimic symptoms (Stice et al., 2000).

Five studies included more intensive education about signs and symptoms, correlates and treatment of eating disorders (Mann et al., 1997; Stewart et al., 2001; Martz et al., 1999; Buddeberg-Fischer et al., 2001; Buddeberg-Fischer et al., 1998). Three of these studies involved one-hour only interventions (Martz et al., 1999), (Mann et al., 1997) which resulted in a statistically significant increase in symptoms (Mann et al., 1997) and reduced body esteem (Martz et al., 1999). One other study showed no overall significant effect in any direction (Buddeberg-Fischer et al., 2001; Buddeberg-Fischer et al., 1998) and a six-week intervention improved knowledge scores and decreased restraint scores.

Length of Follow-Up

Four of the 17 included studies had a follow-up of only the immediate post-test assessment (Fisher et al., 1994; Smolak et al., 1998b; Abood et al., 2000; Raich et al., 1995); four studies had four-week follow-up (Stice et al., 2001; Martz et al., 1999; Stice et al., 2000); four studies had 10 to 12 week follow-up (Zabinski et al., 2001; Mann et al., 1997; Buddeberg-Fischer et al., 2001; Buddeberg-Fischer et al., 1998; Smolak et al., 1998a); two studies had 18 to 24-week follow-up (Killen et al., 1993; Killen, 1996; Stewart et al., 2001); two studies had 11 to 12-month follow-up (Paxton, 1993; O’Dea et al., 2000); and one study had two-year follow-up (Neumark-Sztainer et al., 1995). Shorter follow-up was associated with findings of significance compared with those with longer follow-up. There were two important exceptions. At one-year follow-up O’Dea found statistically significant differences in the importance of social acceptability (decreased in the intervention group and increased in the control group) and improvement of body dissatisfaction in the “at-risk” sub-group (O’Dea et al., 2000). Also, Neumark-Sztainer found that the group at lowest risk at baseline (no reported binge eating) had lower binge eating
if they had been in the intervention group rather than the control group (Neumark-Sztainer et al., 1995).

**Training of Person(s) Delivering Intervention**

In three studies, the interventions were conducted by peer educators (Mann et al., 1997; Fisher et al., 1994; Martz et al., 1999); in five studies they were delivered by regular classroom teachers (O'Dea et al., 2000; Smolak et al., 1998a; Killen et al., 1993; Killen, 1996; Neumark-Sztainer et al., 1995; Smolak et al., 1998b); and in the remaining studies, the interventions were done by the researcher/author or their team (Paxton, 1993; Stewart et al., 2001; Martz et al., 1999; Abood et al., 2000; Stice et al., 2001; Zabinski et al., 2001; Stice et al., 2000; Raich et al., 1995; Buddeberg-Fischer et al., 2001; Buddeberg-Fischer et al., 1998), who usually had a background in psychology. The primary and secondary school interventions were usually done by teachers, whereas the interventions for college students were usually done by researchers/authors. The differing intensities and follow-up of these studies make comparison by training of the person who did the intervention difficult.

**DISCUSSION**

Primary prevention of eating disorders can be delivered through individual counselling, small groups, classroom-based, comprehensive school-based programs, school-based programs with community outreach, integrated community-wide programs, comprehensive national/state policies, and efforts to change societal norms (Rosen et al., 1998). All of the strong and moderate studies were conducted as classroom-based interventions. While all of the studies were aimed at prevention of eating disorders, all used outcome measures of knowledge, attitudes or behaviours that are associated with eating disorders, rather than actual clinical assessments or diagnoses of eating disorders. None of the studies included large enough sample sizes, nor followed the participants long enough to be able to identify change in rates of clinical eating disorders. Every study used outcome measures that had been shown to be risk factors for eating disorders, such as dieting, body dissatisfaction, drive for thinness, bulimia symptoms, self-esteem, eating and exercise attitudes and behaviours, and overall negative affect.

In looking at differences in outcome by target age group, interventions directed at primary school children had more positive outcomes, such as in increasing nutrition knowledge (Smolak et al., 1998a; Smolak et al., 1998b), changing attitudes towards overweight people (Smolak et al., 1998a), and decreasing the importance of social acceptance (O'Dea et al., 2000) than interventions directed at secondary students, none of which had significant effects on overall participants at the last assessment (Neumark-Sztainer et al., 1995; Paxton, 1993; Stewart et al., 2001; Buddeberg-Fischer et al., 2001; Buddeberg-Fischer et al., 1998). The results were more mixed for college students: improved outcomes were body dissatisfaction (Fisher et al., 1994; Stice et al., 2001; Stice et al., 2000; Abood et al., 2000), bulimic symptoms (Stice et al., 2001; Stice et al., 2000), thin-ideal internalization, drive for thinness (Abood et al., 2000), and weight anxiety (Fisher et al., 1994); no differences were found in one very small study (Raich et al., 1995), the Internet-based study (Zabinski et al., 2001) and in a comparison of two alternate active interventions (Fisher et al., 1994; Stice et al., 2001). The findings of the study of two active interventions should be interpreted with caution. Although the exercise component was as successful as the educational component, the authors urge readers to be wary of physical exercise interventions, which may support and validate body disparagement (Fisher et al., 1994; Stice et al., 2001). Giving information about eating disorders did more harm than good. The use of a group leader who is an eating disorder survivor or presenting material regarding signs and symptoms of eating disorders may remove some of the stigma of eating disorders, in effect,
normalizing the behaviours so that more women practice or report these behaviours (Mann et al., 1997; Martz et al., 1999).

Sub-analysis of school groups with scores indicating a higher risk for developing eating disorders showed greater improvements in the intervention group versus the control (Killen et al., 1993; Killen, 1996; O'Dea et al., 2000; Neumark-Sztainer et al., 1995; Buddeberg-Fischer et al., 2001; Buddeberg-Fischer et al., 1998; Stewart et al., 2001). One study found that the lowest risk group, which had not yet used binge eating or other unhealthy weight loss practices, and who participated in the intervention, were the least likely to adopt these harmful practices. Studies that specifically targeted the “at-risk” but non-eating disordered group often found no differences between groups (Fisher et al., 1994; Zabinski et al., 2001; Raich et al., 1995). However, these results should be viewed with caution as all three studies were underpowered. Only one study of “at-risk” participants found an improvement in body dissatisfaction, bulimic symptoms and reduction in thin-ideal internalization (Stice et al., 2000).

An intervention intensity of nine weeks was related to significant improvements in the intervention group (O’Dea et al., 2000) whereas intensities (Smolak et al., 1998a; Neumark-Sztainer et al., 1995; Smolak et al., 1998b) of eight weeks or less showed short-term or no improvements (Stice et al., 2001; Zabinski et al., 2001; Abood et al., 2000). Short-term changes, such as those found immediately post-intervention, were most likely to be achieved, with a trend towards significant findings diminishing as the length of follow-up increased. This suggests that the outcomes would improve with continued exposure to curriculum content, such in the comprehensive healthy schools approach. Much of the content attempted to counter-act social pressures to be thin, to eat little, and to be body-obsessed. Without continued input, it is easy to fall back on dominant social attitudes. Improvements in knowledge seemed easier to attain than changes in attitude or behaviour.

As few studies described the theoretical basis of the interventions, it is not possible to make any summary statement about which is most effective. Likewise, comparisons of the level of personnel who deliver interventions are difficult to make. However, the literature is clear that interventions delivered in the primary schools by teachers had some short-term positive outcomes (O’Dea et al., 2000; Killen et al., 1993; Killen, 1996; Smolak et al., 1998b; Smolak et al., 1998a; Smolak et al., 1998b).

**IMPLICATIONS AND CONCLUSIONS**

While the research does not address the actual clinical assessment of eating disorders, it does address risk factors and characteristics associated with eating disorders. There are several implications for research, practice and policy.

**Implications For Research**

There are several implications for further research. The first has to do more complete reporting of research methods. For example, study reports often did not include critical information such as the actual numbers of participants who experienced various outcome measures; or the educational preparation of person(s) delivering the intervention; and descriptions of method of allocation of the participants to groups or blinding of outcome assessors or study participants were unclear.

Ongoing evaluations of prevention interventions are necessary. Future study designs would be improved by power calculations with subsequent inclusion of adequate sample sizes and follow-
up of two years or longer. Actual clinical assessment of eating disorders should be included. In addition, the development and comparison of interventions would be enhanced by explication of a clear theoretical basis. This should be followed by measures of intervention integrity and fidelity to ensure that interventions are being implemented as planned; most studies did not measure this. The literature reviewed to date suggests that interventions need to be at least nine weeks long. Work should begin on evaluating “booster” sessions, which would repeat and add to the content over a longer period of time, or inclusion of this content in the evaluation of “healthy schools” interventions, particularly at the primary school age groups, beginning at grade 5. Analysis of “at-risk” groups indicates that it may be useful to continue this line of research with the same recommendations as for the population studies.

Further understanding of risk and protective factors would aid in the development of effective prevention programs. Authors have postulated that such factors may be related to body dissatisfaction (Phelps, Johnston, & Augustyniak, 1999; Franko & Orosan-Weine, 1998), the nature of parent-child relationships during the transition to adolescence (Graber & Brooks-Gunn, 1996), peer influences (Paxton, 1996) and other relational and contextual factors (Piran, 1995).

Implications For Practice

Some harm may result from interventions that include specific content about signs and symptoms and treatment of eating disorders. There is far less likelihood of harm and greater likelihood of positive outcomes when interventions focus on content related to reducing concerns with food, weight and body size. Given the great public health concern for overweight and obesity, the content should focus on healthy eating and healthy activity levels.

The literature showed that positive outcomes were achieved in primary school programs, beginning at grade 5. Interventions during college years had positive effects, whereas those in high school showed no effects. To date, it appears that primary prevention aimed at grade school populations beyond grade 4 should be recommended, without targeting “at-risk” sub-populations. Interventions should be at least nine weeks in order to maximize the potential to change outcomes. Curricula delivered by school teachers can be effective. Rosen and Neumark-Sztainer described the components of a model school-based program (Rosen et al., 1998) [pg 360]:

1. staff training for teachers, coaches, counsellors, and food services
2. classroom interventions specifically aimed at prevention of eating disturbances
3. integration of relevant material into existing curricula
4. opportunities for healthy eating at school, and
5. modifications within physical education programs
6. outreach activities to the community by students, staff and parents.

Rosen also suggests that the prevention be augmented with individual counselling and small group work for high-risk youth and referral systems for students with eating disorders. (Rosen et al., 1998).

Training, monitoring and on-going support need to be in place in order to maximize outcomes. Longer interventions and comprehensive school health programs should include media awareness, healthy eating and exercise and self-esteem issues.

Implications For Policy

Public Health Departments should partner with school boards and researchers to develop, implement and evaluate curricula of at least nine weeks. Studies with positive outcomes should
be used as a beginning point to further test interventions, for teacher training, and for a basis of evaluation. Resources would be necessary to buy curriculum materials, train teachers and conduct evaluation. Consideration should be given to development and evaluation of large scale community-wide programs. For example, in Norway, a national program for primary prevention of eating disorders has been developed and implementation is underway, but no evaluation has been done to date (Gresko & Karlsen, 1994).

Conclusions

In summarizing the results from 18 reports of 17 different studies, it is apparent that curricula interventions in schools can have a positive effect, particularly short-term, on improving measures of knowledge, and to a lesser extent, attitudes and behaviours associated with risk factors for or characteristics of people with eating disorders.
Table 1: Included Studies - Summary of Strong and Moderate Articles

A. Interventions for Primary School Students

<table>
<thead>
<tr>
<th>Study</th>
<th>Design/Quality Rating</th>
<th>Participants</th>
<th>Intervention</th>
<th>Outcomes</th>
<th>Results/Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Killen</td>
<td>Clinical controlled trial, Moderate</td>
<td>967 girls in grades 6 and 7, mean age of 12.4 years</td>
<td>Curricula, re: unhealthy weight regulation, healthy eating and activity, coping skills development re: how to resist sociocultural pressure to be thin</td>
<td>18 week follow-up</td>
<td>Secondary analysis of high-risk girls (scored over 57 on weight concerns scale) showed significant increase in knowledge (of healthy weight regulation, how cultural factors affect attitudes, dangers of using laxative and diet pills for weight loss) in intervention group but no other differences.</td>
</tr>
<tr>
<td>USA 1993 &amp; 1996</td>
<td></td>
<td>Differing &quot;n's for different outcome measures</td>
<td>Randomized within school and grade</td>
<td>18 weeks, one session per week for 50 minutes</td>
<td>Delivered by teachers</td>
</tr>
<tr>
<td>Smolak</td>
<td>Cohort analytic, Moderate</td>
<td>11 grade 4 classes (boys and girls)</td>
<td>Curriculum re: healthy eating, Food Pyramid, exercise, body shape and body image issues, reducing dieting behaviour, critical evaluation of media messages</td>
<td>Immediate post-test</td>
<td>No measure of how many of the 10 sessions were actually taught by teachers.</td>
</tr>
<tr>
<td>USA 1998</td>
<td></td>
<td>194 children in intervention</td>
<td>10 lessons taught by teachers as they saw fit to implement</td>
<td>Significant:</td>
<td>Intervention group improved scores on knowledge of need for variety in food intake.</td>
</tr>
<tr>
<td>&quot;Eating Smart, Eating for Me&quot;</td>
<td></td>
<td>105 in control</td>
<td></td>
<td>Non-significant:</td>
<td>Total consumption of fruit and vegetables</td>
</tr>
<tr>
<td></td>
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<td></td>
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<td></td>
<td>Exercise</td>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td>Teasing of others about weight and shape</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
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<td></td>
<td>Body esteem</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Weight loss attempts</td>
</tr>
<tr>
<td>Study</td>
<td>Design/ Quality Rating</td>
<td>Participants</td>
<td>Intervention</td>
<td>Outcomes</td>
<td>Results/Comments</td>
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</tbody>
</table>
| Smolak USA 1998 “Eating Smart” | Cohort analytic Moderate | 222 white, public school children in grade 5  
- 167 in curriculum classrooms  
- 55 in no intervention control | 10-lesson curriculum designed to encourage healthy eating, exercise, body image and to discourage calorie restriction, exercise for weight loss and development of body dissatisfaction  
- Delivered by regular classroom teachers after 2-hour training session  
- 9 newsletters to parents | Follow-up at 4 months  
**Significant:**  
- Curriculum group showed greater understanding of breakfast as important meal, effect of puberty on body fat, heritability of body shape, dieting ineffectiveness  
- Girls in control classes decreased vegetable consumption; boys in control classes increased vegetable consumption  
- Control group held less negative attitudes to overweight people  
**Non-significant:**  
- Total fruit and vegetable consumption  
- All children increased teasing of others about weight and shape  
- Body esteem  
- Weight loss attempts | Non-significant effect on knowledge of recommended servings/day of fruits and vegetables, need for variety of food, need for exercise. However, high pretest knowledge scores on food intake recommendations.  
Teachers were unsupervised and they were not required to do all lessons.  
No measure of intervention fidelity.  
Possibility of contamination as intervention and control classes were sometimes in the same school. |
| O’Dea Australia 2000 “Everybody’s Different” | Clinical controlled trial Strong | 470 children (173 boys, 297 girls) in two schools, enrolled in years 7 & 8  
- 275 in intervention  
- 195 in control | Play, drama, group work to promote positive self-esteem, positive environment, dealing with stress, resisting stereotypes, communication and relationships.  
- Taught by teachers  
- 9 sessions once/week for 50–80 minutes | Post-intervention  
**Significant:**  
- Intervention group improved over control group  
- Body dissatisfaction, drive for thinness  
- Importance of physical appearance  
- Reduced importance of social acceptance  
12 month follow-up | Students and teachers blind to purpose of the study.  
Analysis of high-risk sub-group showed significant effect of intervention on improving body dissatisfaction and perceived importance of close friendship, and decreased importance of social acceptance and physical appearance.  
At immediate post-intervention, body dissatisfaction increased in control group, decreased in intervention group. |
<table>
<thead>
<tr>
<th>Study</th>
<th>Design/ Quality Rating</th>
<th>Participants</th>
<th>Intervention</th>
<th>Outcomes</th>
<th>Results/Comments</th>
</tr>
</thead>
<tbody>
<tr>
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<td></td>
<td>Significant:</td>
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<td></td>
<td>Intervention group improved in these dimensions (control group worsened)</td>
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<td></td>
<td></td>
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<td></td>
<td>• Reduced importance of social acceptance (peer group acceptability and popularity)</td>
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<td>• Reduced importance in intervention group and increased for the control group</td>
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<td>Non-significant:</td>
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<td></td>
<td></td>
<td>• Drive for thinness, body dissatisfaction</td>
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<td></td>
<td>• Anxiety, depression</td>
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<td>• Proportion currently trying to lose weight</td>
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</tbody>
</table>

**B. Interventions for Secondary School Students**

<table>
<thead>
<tr>
<th>Study</th>
<th>Design/ Quality Rating</th>
<th>Participants</th>
<th>Intervention</th>
<th>Outcomes</th>
<th>Results/Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buddeberg-Fischer</td>
<td>Clinical controlled trial Strong</td>
<td>1944 adolescents (boys and girls) screened 329 students (14-19 years of age) in 20 classes that had a high proportion of students who scored high (&gt;10) on Eating Attitudes Scale (a measure of sub-clinical eating disturbance) 10 classes in intervention 10 classes in control</td>
<td>School curriculum re: beauty ideal, gender differences in maturation and body awareness, healthy eating and nutrition, early symptoms of eating disorders and treatment  • Given in 3 sessions, once/month for 90 minutes  • Conducted by research team</td>
<td>12 week follow-up Non-significant:  • Eating attitudes  • Overall distress or general symptom index.</td>
<td>Reduction in symptoms in both groups.  Significant reduction in scores in high-risk group who had the intervention versus those in the control group.</td>
</tr>
<tr>
<td>Study</td>
<td>Design/ Quality Rating</td>
<td>Participants</td>
<td>Intervention</td>
<td>Outcomes</td>
<td>Results/Comments</td>
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</table>
| Neumark-Sztainer, Israel, 1995 “Weigh to Eat” | Cohort analytic Moderate | 341 grade 10 girls in Jerusalem high school | 10-lesson curriculum included guidelines for healthy eating and physical activity, body image, critical analysis of weight loss methods, information about eating disorders, assertiveness, and how to modify the social environment re: eating behaviours and weight concerns. | Follow-up at 6 months | Significant:  
- Intervention group had better scores in nutrition knowledge, more regular meal patterns, and exercised more frequently than control group;  
- Delayed onset of binging and use of unhealthy weight loss methods in intervention group in girls who reported not engaging in those behaviours at baseline  
Non-significant:  
- No differences in body dissatisfaction, self-esteem, attitudes towards weight loss methods, food preferences, weight loss attempts  
Follow-up at 2 years | Significant:  
- Reduction in binge eating in low-risk group (those who reported not engaging in that behaviour at baseline)  
Non-significant:  
- No other significant differences remained. |

Mixed design – one entire school assigned to intervention, one entire school assigned to control, third school classes randomly assigned to control and intervention  
Secondary analysis of girls with BMI >23.8 found that those in the intervention group were less likely to report recent dieting, use of unhealthy weight loss methods and binging.  
Intervention took place at time the Gulf War broke out; authors postulate this had an effect on perceived relevance and importance of course content, as well as on the capacity to change behaviour during a time of greater stress.
<table>
<thead>
<tr>
<th>Study</th>
<th>Design/Quality Rating</th>
<th>Participants</th>
<th>Intervention</th>
<th>Outcomes</th>
<th>Results/Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paxton</td>
<td>Cohort analytic</td>
<td>136 grade 9 girls in 3 different private schools</td>
<td>Curriculum re: media influence, determinants of size and shape, nutrition, weight loss and dieting, emotional eating</td>
<td></td>
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</tr>
<tr>
<td>Australia</td>
<td>Moderate</td>
<td>• 125 in intervention</td>
<td>• 5-week curriculum, once per week for 1.5 hours</td>
<td>Follow-up at 11 months</td>
<td>There was a trend towards body dissatisfaction increasing in all groups over time.</td>
</tr>
<tr>
<td>1993</td>
<td></td>
<td>• 34 in control</td>
<td>Delivered by author</td>
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<tr>
<td>“Body Image</td>
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<td>Non-significant:</td>
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<tr>
<td>and Eating</td>
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<td>• Restraint, bulimia, drive for thinness, weight control behaviour</td>
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<tr>
<td>Behaviour</td>
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<td>• Ideal figure or body dissatisfaction</td>
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<tr>
<td>Intervention</td>
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<tr>
<td>Program”</td>
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<tr>
<td>Stewart</td>
<td>Cohort analytic</td>
<td>Year 9 in 6 different girls schools</td>
<td>Developmental framework for intervention; somewhat based on cognitive-behavioural interventions for treating eating disorders.</td>
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<tr>
<td>UK</td>
<td>Moderate</td>
<td>• 474 in intervention</td>
<td>Designed to promote behaviour and attitude change; focused on adjustment to puberty, development of eating disorders, dealing with socio-cultural pressures to be thin, body image dissatisfaction, low self-esteem and dieting.</td>
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<tr>
<td>2001</td>
<td></td>
<td>• 386 in control</td>
<td></td>
<td>Follow-up at 6 months</td>
<td>In the intervention group, restraint, shape concerns, eating concerns, eating disorder examination scores decreased immediately following the intervention, but increased at 6 months.</td>
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<tr>
<td></td>
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<td></td>
<td></td>
<td>Significant:</td>
<td>Differences in restraint scores may not be clinically significant, even though statistically significant.</td>
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<td></td>
<td>• Restraint lower in intervention than control group</td>
<td>There was a greater effect on dieters in the intervention group than dieters in the control group on reducing dietary restraint.</td>
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<td></td>
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<td>• Higher knowledge scores in intervention</td>
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<td></td>
<td></td>
<td>Non-significant:</td>
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<td></td>
<td></td>
<td>• Weight and eating concerns</td>
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<td></td>
<td>• Self-concept</td>
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<td></td>
<td></td>
<td>• Total scores on Eating Disorder Examination, Eating Attitudes test</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>• Eating disorder behaviours</td>
<td></td>
</tr>
<tr>
<td>Abood</td>
<td>Clinical controlled trial</td>
<td>70 female college athletes from different sports</td>
<td>Educational workshop, not part of regular curriculum</td>
<td>Immediate post-test</td>
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<tr>
<td>USA</td>
<td>Strong</td>
<td>35 in intervention 35 in control</td>
<td>Focused on body image, self-esteem, relaxation, caloric and nutrition needs of athletes, nutrition beliefs and myths, goal setting, correcting distorted thoughts. 8 sessions, 1 hour/week Led by researcher</td>
<td>Significant: Greater decrease in body dissatisfaction and drive for thinness in intervention versus control group Control group had a significant decline in nutrition knowledge, and self-esteem Non-significant: Self-rated anxiety Sport competition anxiety Nutrition beliefs and myths</td>
<td></td>
</tr>
<tr>
<td>2000</td>
<td></td>
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<td>Trainers called the athletes the night before each session to remind them to attend. 96% of athletes completed all sessions.</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Fisher</th>
<th>Controlled Clinical Trial</th>
<th>500 undergraduate females screened to include people who had low appearance evaluation but no symptoms of eating disorders</th>
<th>Group 1. Cognitive–behaviour intervention</th>
<th>Post-intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA</td>
<td>Moderate</td>
<td>16 in cognitive – behavioural intervention 14 in exercise intervention 16 in control</td>
<td>Incorporated relaxation, imagery, mirror and video desensitization exercises, self-monitoring, work on cognitive restructuring and stress inoculation, some homework Conducted by peer educator 1 hour/week for 6 weeks</td>
<td>Significant: Both interventions Less weight anxious Reduced body dissatisfaction than controls Non-significant: Avoidance of body-image related behaviours</td>
</tr>
<tr>
<td>1994</td>
<td></td>
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<td>Danger of using exercise program to validate body disparagement.</td>
</tr>
</tbody>
</table>

|                        |                           |                                                   |                                          |                     |
| 3. Control             |                           |                                                   |                                          |                     |

Table 1: Characteristics of Included Studies
<table>
<thead>
<tr>
<th>Author</th>
<th>USA</th>
<th>Country</th>
<th>Group Type</th>
<th>Setting</th>
<th>Sample Size</th>
<th>Intervention Description</th>
<th>Follow-up</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mann</td>
<td></td>
<td>USA</td>
<td>Solomon 4</td>
<td>USA</td>
<td>344</td>
<td>Workshop aimed at primary and secondary prevention</td>
<td>12 week follow-up</td>
<td>Non-significant: Effect on symptoms, Weight satisfaction, Self-esteem</td>
</tr>
<tr>
<td></td>
<td>1997</td>
<td></td>
<td>group</td>
<td></td>
<td>female college freshmen</td>
<td>Actual “n”s not given; “about half” participated in intervention and half in the control</td>
<td></td>
<td>Low power to detect a small effect (30%).</td>
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<td></td>
<td>Randomly selected dorms.</td>
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<td>Short-term effect of increasing symptoms in the intervention group.</td>
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<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>Workshop aimed at primary and secondary prevention</td>
<td></td>
<td>Authors postulated that intervention reduced stigma of eating disorders and inadvertently normalized them.</td>
</tr>
<tr>
<td>Martz</td>
<td></td>
<td>USA</td>
<td>(a) Solomon 4 group design</td>
<td>USA</td>
<td>Female college students, mean age of 19 years</td>
<td>Psycho-educational intervention re: healthy eating and exercise, body image dissatisfaction, media influence, symptoms and causes of eating disorders</td>
<td>4 week follow-up</td>
<td>Significant: Intervention group improved over control group on Reduced dieting, Improved body esteem</td>
</tr>
<tr>
<td></td>
<td>1999</td>
<td></td>
<td>Moderate</td>
<td></td>
<td>73 in intervention, 41 in control</td>
<td>One hour only Delivered by peer educator</td>
<td></td>
<td>Two distinct studies described in one paper.</td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
<td>Psycho-educational intervention re: healthy eating and exercise, body image dissatisfaction, media influence, symptoms and causes of eating disorders</td>
<td></td>
<td>Probably not a clinically significant difference (4 points on cognitive-behavioural dieting scale; 0.2 points on body esteem scale)</td>
</tr>
<tr>
<td>Martz</td>
<td></td>
<td>USA</td>
<td>(b) Clinical controlled trial</td>
<td>USA</td>
<td>Female college students, mean age of 19 years</td>
<td>As in Martz (a) but added more emotionally persuasive content, relaxation and guided imagery</td>
<td>4 week follow-up</td>
<td>Significant: Intervention group versus control Reduced dieting, Reduced body esteem</td>
</tr>
<tr>
<td></td>
<td>1999</td>
<td></td>
<td>Moderate</td>
<td></td>
<td>30 in intervention, 47 in controls</td>
<td>Delivered by author</td>
<td></td>
<td>Unusual to have both reduced dieting and reduced body esteem; probably not a clinically meaningful difference (0.9 points on cognitive-behavioural dieting scale; 0.5 points on body esteem scale).</td>
</tr>
<tr>
<td>Raich</td>
<td></td>
<td>Spain</td>
<td>Clinical controlled trial</td>
<td>Spain</td>
<td>17 female college students over 18 years of age, who scored above 105 on the translation of the Body Shape Questionnaire, indicating body dysmorphic disorder</td>
<td>Cognitive-behavioural intervention Focused on 3 aspects of body image: perceptual, cognitive and behavioural self-monitoring diaries, size estimation exercises, rehearsal of positive self statements, systematic desensitization, relapse prevention</td>
<td>Immediate post-test</td>
<td>Non-significant: Body image, Self-esteem, Body shape</td>
</tr>
<tr>
<td></td>
<td>1995</td>
<td></td>
<td>Moderate</td>
<td></td>
<td>11 in intervention, 6 in control</td>
<td>8 weekly 1-hour sessions Led by therapist, supervised by clinical psychologist</td>
<td></td>
<td>Pilot study. Sample size too small to show any differences.</td>
</tr>
</tbody>
</table>

Table 1: Characteristics of Included Studies
<table>
<thead>
<tr>
<th>Study</th>
<th>Study Type</th>
<th>Cohort</th>
<th>Participants</th>
<th>Intervention Details</th>
<th>Follow-up</th>
<th>Findings</th>
</tr>
</thead>
</table>
| Stice USA 2000 | Cohort analytic | Moderate | 30 female college undergraduates with elevated body image concerns  
- 10 in intervention  
- 20 in control | Dissonance-based intervention where participants voluntarily argued against the thin ideal through counter-attitudinal role play.  
Content re: body satisfaction, body image, critical analysis of thinness and cost/benefits of pursuit of thinness  
- Researcher taught 3 sessions once/week for 1 hour | 4 week follow-up | Significant:  
- Intervention participants had improvement over control group in  
  - Thin-ideal internalization  
  - Body dissatisfaction  
  - Bulimic symptoms  
Non-significant:  
- Dieting behaviours  
- Negative affect |
| Stice USA 2001 | Clinical controlled trial | Moderate | 87 female college students, mean age 19 years  
- 48 in dissonance-based intervention  
- 39 in healthy weight management control | Dissonance-based intervention where participants voluntarily argued against the thin ideal through counter-attitudinal role play.  
Content re: body satisfaction, body image, critical analysis of thinness and cost/benefits of pursuit of thinness  
- Body acceptance exercise, role play resistance to peer pressure  
Healthy weight maintenance Control group  
- Balanced diet, moderate exercise, low-fat eating, diet and exercise monitoring.  
Both taught in 3 sessions, one hour, once/week by clinical psychologist | 4-week follow-up | Significant:  
- Intervention participants had improvement over control group in  
  - Thin-ideal internalization  
Non significant:  
- Body dissatisfaction  
- Dieting behaviours  
- Negative affect  
- Bulimic symptoms  
- Exercise levels |

Increase in bulimic symptoms in control group.  
Similar reduction in dieting behaviours and bulimic symptoms in both groups.  
Both interventions improved in body dissatisfaction, bulimic symptoms and dieting behaviours; control intervention may have been more active than anticipated.  
Healthy weight control group showed immediate post-test reduction in fat consumption, not statistically significant at 4 weeks.
<table>
<thead>
<tr>
<th>Zabinski</th>
<th>Clinical controlled trial</th>
<th>62 female college students who scored over 110 on Body Shape questionnaire, (considered high risk for eating disorders); excluded those with self-reported current or past eating disorder, BMI &lt;19, or if purging once/month or more</th>
</tr>
</thead>
</table>
| USA | Moderate | • 31 in intervention
• 31 in control |
| 2001 | “Student Bodies” software and electronic bulletin board |
| “Student Bodies” | Intervention based on psychoeducation
8 weeks
Electronic bulletin board monitored by psychology graduate student
Phone call from research assistants weekly to intervention group, every 4 weeks to control group |
| Follow-up at 10 weeks |
| Non-significant: All outcomes improved in both groups |
| • Drive for thinness
• Body shape questionnaire
• Weight and shape concerns
• Eating and restraint |
| Mean pre-treatment BMI of 24.9 |
| Greater effect sizes in intervention group. |
| Women in the intervention read an average of 80.5% of assigned web pages; participation was higher in the first 4 weeks and dropped in the last 4 weeks. |
| 70.7% of participants posted 1-2 messages per week. Average of 19.6 postings each over the 8 weeks. |
| Participants rated a high level of support and ability to talk about concerns on bulletin board. |
| Subjects chosen for high scores; could have experienced regression to the mean. |
| Small sample size. |
References


APPENDICES

Appendix A: Search Strategy
Appendix B: Relevance Tool
Appendix C: Quality Assessment Tool
Appendix D: Data Extraction Tool
Appendix E: Studies Rated Relevant and Weak
Appendix F: Not Rated: Studies of Interventions Without Control Groups
## Appendix A: Search Strategy

<table>
<thead>
<tr>
<th>Effectiveness</th>
<th>Strategies</th>
<th>Prevention</th>
<th>Eating Disorders</th>
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<tr>
<td>effective:</td>
<td>intervention:</td>
<td>prevent:</td>
<td>exp eating disorders/</td>
</tr>
<tr>
<td>evaluat:</td>
<td>program:</td>
<td>prophyla:</td>
<td>binge eating</td>
</tr>
<tr>
<td>efficacy</td>
<td>counsel:</td>
<td></td>
<td>binging</td>
</tr>
<tr>
<td>outcome</td>
<td>curricul:</td>
<td></td>
<td>overeating</td>
</tr>
<tr>
<td>impact</td>
<td>education</td>
<td></td>
<td>compulsive eating</td>
</tr>
<tr>
<td>evidence</td>
<td>health promotion/</td>
<td></td>
<td>disturbed eating</td>
</tr>
<tr>
<td></td>
<td>media</td>
<td></td>
<td>exercise disorder</td>
</tr>
<tr>
<td></td>
<td>campaign:</td>
<td></td>
<td>body image</td>
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<tr>
<td></td>
<td>school:</td>
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<tr>
<td></td>
<td>marketing</td>
<td></td>
<td>purging</td>
</tr>
<tr>
<td></td>
<td>group:</td>
<td></td>
<td>laxative misuse</td>
</tr>
<tr>
<td></td>
<td>activit:</td>
<td></td>
<td>laxative abuse</td>
</tr>
<tr>
<td></td>
<td>promotion</td>
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**Coverage:** 1990-2001  
**Language:** English  

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<tr>
<td>exp neoplasms/</td>
</tr>
<tr>
<td>animal/</td>
</tr>
<tr>
<td>pica/</td>
</tr>
<tr>
<td>coprophasia/</td>
</tr>
</tbody>
</table>
# Appendix B: Relevance Tool

## Primary Prevention of Eating Disorders

Ref. ID: _____________
Reviewer: DC  JB

### Relevance Criteria:

1. The study involves an intervention applicable to public health practice, consistent with Ontario's Mandatory Health Programs and Services Guidelines.
   - Y N

2. Subjects are preadolescent (beginning at age 9), adolescents (to age 18) or young adults (18 and over).
   - Y N

3. The study examines an intervention. (can include classes, school-based, free-standing clinics, community based activities, media campaigns, written information, other population-based strategies aimed at preventing eating disorders or negative attitudes and behaviours associated with eating disorders)
   - Y N

4. Information on outcomes are reported for knowledge, attitudes, behavioural intention or behaviour.
   - Y N

5. Study design is concurrent or historical control group (randomized, quasi-randomized controlled trials, cohort studies, case-control studies).
   - Y N

### Reviewer Decision:

1. Include in critical appraisal (only if answer 'yes' to all 5 relevance criteria).
   - Y N

2. **If Discrepancy in Inclusion Decision:**

   Reason for discrepancy:

   - Oversight
     - Y N
   - Difference in interpretation of criteria
     - Y N
   - Differences in interpretation of study
     - Y N

### Additional Comments:

**FINAL DECISION:** INCLUDE IN STUDY

- Y N

**Bibliographic References**

Please remember to check reference list for potentially relevant studies.
Appendix C: Quality Assessment Tool for Quantitative Studies

COMPONENT RATINGS

A) SELECTION BIAS

(Q1) Are the individuals selected to participate in the study likely to be representative of the target population?
   1 Very likely
   2 Somewhat likely
   3 Not likely
   4 Can’t tell

(Q2) What percentage of selected individuals agreed to participate?
   1 80 - 100% agreement
   2 60 – 79% agreement
   3 less than 60% agreement
   4 Not applicable
   5 Can’t tell

B) STUDY DESIGN

Indicate the study design
   1 Randomized controlled trial
   2 Controlled clinical trial
   3 Cohort analytic (two group pre + post)
   4 Case-control
   5 Cohort (one group pre + post (before and after))
   6 Interrupted time series
   7 Other specify _______
   8 Can’t tell

Was the study described as randomized?

No Yes

If NO, go to component C

If Yes, was the method of randomization described? (see dictionary)
   No Yes

If Yes, was the method appropriate? (see dictionary)
   No Yes

RATE THIS SECTION STRONG MODERATE WEAK

See dictionary 1 2 3
C) CONFOUNDERs

(Q1) Were there important differences between groups prior to the intervention?
   1. Yes
   2. No
   3. Can’t tell

The following are examples of confounders:
   1. Race
   2. Sex
   3. Marital status / family
   4. Age
   5. SES (income or class)
   6. Education
   7. Health status
   8. Pre-intervention score on outcome measure

(Q2) If yes, indicate the percentage of relevant confounders that were controlled (either in the design (e.g. stratification, matching) or analysis)?
   1. 80 – 100%
   2. 60 – 79%
   3. Less than 60%
   4. Can’t Tell

<table>
<thead>
<tr>
<th>RATE THIS SECTION</th>
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<th>MODERATE</th>
<th>WEAK</th>
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<tbody>
<tr>
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<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

D) BLINDING

(Q1) Was (were) the outcome assessor(s) aware of the intervention or exposure status of participants?
   1. Yes
   2. No
   3. Can’t tell

(Q2) Were the study participants aware of the research question?
   1. Yes
   2. No
   3. Can’t tell

<table>
<thead>
<tr>
<th>RATE THIS SECTION</th>
<th>STRONG</th>
<th>MODERATE</th>
<th>WEAK</th>
</tr>
</thead>
<tbody>
<tr>
<td>See dictionary</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

E) DATA COLLECTION METHODS

(Q1) Were data collection tools shown to be valid?
   1. Yes
   2. No
   3. Can’t tell

(Q2) Were data collection tools shown to be reliable?
   1. Yes
   2. No
   3. Can’t tell

<table>
<thead>
<tr>
<th>RATE THIS SECTION</th>
<th>STRONG</th>
<th>MODERATE</th>
<th>WEAK</th>
</tr>
</thead>
<tbody>
<tr>
<td>See dictionary</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>
F) WITHDRAWALS AND DROP-OUTS

(Q1) Were withdrawals and drop-outs reported in terms of numbers and reasons per group?
   1 Yes
   2 No
   3 Can't tell

(Q2) Indicate the percentage of participants completing the study. (If the percentage differs by groups, record the lowest).
   1 80 -100%
   2 60 - 79%
   3 less than 60%
   4 Can't tell

G) INTERVENTION INTEGRITY

(Q1) What percentage of participants received the allocated intervention or exposure of interest?
   1 80 -100%
   2 60 - 79%
   3 less than 60%
   4 Can't tell

(Q2) Was the consistency of the intervention measured?
   1 Yes
   2 No
   3 Can't tell

(Q3) Is it likely that subjects received an unintended intervention (contamination or co-intervention) that may influence the results?
   1 Yes
   2 No
   3 Can’t tell

H) ANALYSES

(Q1) Indicate the unit of allocation (circle one)
   community organization/institution practice/office provider client

(Q2) Indicate the unit of analysis (circle one)
   community organization/institution practice/office provider client

(Q3) Are the statistical methods appropriate for the study design?
   1 Yes
   2 No
   3 Can’t tell

(Q4) Is the analysis performed by intervention allocation status (i.e. intention to treat) rather than the actual intervention received?
   1 Yes
   2 No
   3 Can’t tell

RATE THIS SECTION STRONG MODERATE WEAK
See dictionary 1 2 3
GLOBAL RATING

COMPONENT RATINGS

Please transcribe the information from the gray boxes on pages 2-4 onto this page.

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>A SELECTION BIAS</th>
<th>B STUDY DESIGN</th>
<th>C CONFOUNDERS</th>
<th>D BLINDING</th>
<th>E DATA COLLECTION METHODS</th>
<th>F WITHDRAWALS AND DROPOUTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>RATE THIS SECTION</td>
<td>STRONG 1</td>
<td>MODERATE 2</td>
<td>WEAK 3</td>
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<td>MODERATE 2</td>
<td>WEAK 3</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

GLOBAL RATING FOR THIS PAPER (circle one)

1 STRONG (four STRONG ratings with no WEAK ratings)
2 MODERATE (less than four STRONG ratings and one WEAK rating)
3 WEAK (two or more WEAK ratings)

WITH BOTH REVIEWERS DISCUSSING THE RATINGS:

Is there a discrepancy between the two reviewers with respect to the component (A-F) ratings?
No Yes

If yes, indicate the reason for the discrepancy

1 Oversight
2 Differences in interpretation of criteria
3 Differences in interpretation of study

FINAL DECISION OF BOTH REVIEWERS (circle one):
1 STRONG
2 MODERATE
3 WEAK
### Appendix D: Core Data Extraction Form

**Reviewer:**

**Review Name:**

#### Study Identification

First Author: 

Year of publication: 19____

Language of publication:
- English
- French
- Other language (specify) _________

Country:
- Canada
- United States
- United Kingdom
- Other (specify) _________
- Can't tell

#### Design

Years data collected: 19____ to 19____

Number of intervention groups: _________

Number of control groups: _________

Number of subjects screened: _________

Number of eligible subjects: _________

#### Number of allocated subjects (total and by group)

<table>
<thead>
<tr>
<th>Group</th>
<th>Total</th>
<th>Intervention #1</th>
<th>Intervention #2</th>
<th>Intervention #3</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>_________</td>
<td>☐ Can’t tell</td>
<td>☐ Can’t tell</td>
<td>☐ Can’t tell</td>
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</table>

#### Number of drop-outs (total and by group)

<table>
<thead>
<tr>
<th>Group</th>
<th>Total</th>
<th>Intervention #1</th>
<th>Intervention #2</th>
<th>Intervention #3</th>
<th>Control</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>_________</td>
<td>☐ Can’t tell</td>
<td>☐ Can’t tell</td>
<td>☐ Can’t tell</td>
<td>☐ Can’t tell</td>
</tr>
</tbody>
</table>

#### Source of funding for the study (check all that apply)

- ☐ Governmental organization
- ☐ Commercial organization
- ☐ Health-care provider organization
- Voluntary body (e.g. Health Promotion Organization)
- Charitable trust
- Research funding body (e.g. Medical Research Council)
- Other (specify) ______________________
- Can’t Tell

Sample

Sex (Check one box only) ☐ Male ☐ Female ☐ Mixed ☐ Can’t tell
Age (specify mean and range) mean________upper________lower _______ ☐
Can’t tell
Ethnicity (specify) ______________________ ☐ Can’t tell
Education (Check one box only)
- Completed grade school
- Completed high school
- Completed university
- Mix
- Other _____________
- Can’t tell

Residential Setting (Check one box only)
☐ Urban ☐ Mix
☐ Rural ☐ Can’t Tell

Social-economic status (specify) ______________________ ☐ Can’t Tell
(e.g. income, employment)

**Intervention – Describe for each intervention as applicable:**

<table>
<thead>
<tr>
<th>Intervention #1</th>
<th>Intervention #2</th>
<th>Intervention #3</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eg. Frail elders personalized program plus community development program</td>
<td></td>
<td></td>
<td>Eg. Visits by project community development program</td>
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</table>

**Intervention descriptors: (check all that apply)**

<table>
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<th>Community development</th>
<th>Intervention #1</th>
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<tbody>
<tr>
<td>Community-based</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

Appendix D: Data Extraction Tool
### Appendix D: Data Extraction Tool

#### Mass media
- Distribution of printed educational materials (e.g., Fact sheets, posters)
- Educational session (workshops)
- School curriculum
- Counseling (one to one)
- Computer-based learning
- Audio-visual materials (e.g., Videos)
- Support group
- Other (specify)

#### Theoretical framework: (check all that apply for each intervention and control)

<table>
<thead>
<tr>
<th>Intervention #1</th>
<th>Intervention #2</th>
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<tbody>
<tr>
<td>Trans theoretical</td>
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<td>PRECEDE</td>
<td>○</td>
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</tr>
<tr>
<td>Intention and action</td>
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<td>○</td>
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<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Diffusion of innovation</td>
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<td>○</td>
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<tr>
<td>Social marketing theory</td>
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</tr>
<tr>
<td>Can't tell</td>
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<tr>
<td>Other (specify)</td>
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#### Intervention provider: (state who (or what) delivered the intervention. check all that apply)

<table>
<thead>
<tr>
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<th>Intervention #2</th>
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<th>Control</th>
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<tbody>
<tr>
<td>Professional (state profession)</td>
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<td>Research worker (member of study team)</td>
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<tr>
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<tr>
<td>Lay person</td>
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</tr>
<tr>
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</tr>
<tr>
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<td>○</td>
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</tr>
<tr>
<td>Community groups</td>
<td>○</td>
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<tr>
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#### Internal training provided:

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<th>Intervention #3</th>
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<tr>
<td>Can't tell</td>
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<td>○</td>
<td>○</td>
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#### Intervention setting: (check all that apply)

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<th>Intervention #3</th>
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**Hospital**

- [ ]

**School**

- [ ]

**Telephone**

- [ ]

**Worksite**

- [ ]

**Clinic**

- [ ]

**Can’t Tell**

- [ ]

**Other (Specify)**

- [ ]

---

### Intervention target group: (check all that apply)

<table>
<thead>
<tr>
<th>Intervention target group</th>
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<th>Control</th>
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<td>[ ]</td>
</tr>
<tr>
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<td>[ ]</td>
<td>[ ]</td>
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<tr>
<td>Adolescents</td>
<td>[ ]</td>
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<tr>
<td>Pregnant women</td>
<td>[ ]</td>
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<tr>
<td>Parents</td>
<td>[ ]</td>
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<tr>
<td>Adults</td>
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<td>[ ]</td>
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<td>[ ]</td>
</tr>
<tr>
<td>Seniors</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
</tr>
<tr>
<td>Family care givers</td>
<td>[ ]</td>
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<tr>
<td>Health Professionals</td>
<td>[ ]</td>
<td>[ ]</td>
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</tr>
<tr>
<td>Other (Specify)</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
</tr>
<tr>
<td>Can’t tell</td>
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### Target group size: (check all that apply)

<table>
<thead>
<tr>
<th>Target group size</th>
<th>Intervention #1</th>
<th>Intervention #2</th>
<th>Intervention #3</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual</td>
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<tr>
<td>Family</td>
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<tr>
<td>Group</td>
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<tr>
<td>Community</td>
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<tr>
<td>Can’t Tell</td>
<td>[ ]</td>
<td>[ ]</td>
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</tbody>
</table>

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### Consumer involvement: Were consumers (i.e. members of the public) involved at any point of the design, conduct or interpretation of the study? (e.g., consumers involved in guideline development, or their views collected)

<table>
<thead>
<tr>
<th>Consumer involvement</th>
<th>Intervention #1</th>
<th>Intervention #2</th>
<th>Intervention #3</th>
<th>Control</th>
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<tbody>
<tr>
<td>Yes</td>
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<td>[ ]</td>
<td>[ ]</td>
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<tr>
<td>No</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
</tr>
<tr>
<td>Can’t Tell</td>
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### Intervention duration:

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<th>Intervention #1</th>
<th>Intervention #2</th>
<th>Intervention #3</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Can’t tell</td>
<td>[ ]</td>
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</tbody>
</table>

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### Intervention frequency:

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<th>Intervention #1</th>
<th>Intervention #2</th>
<th>Intervention #3</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Can’t tell</td>
<td>[ ]</td>
<td>[ ]</td>
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<td>[ ]</td>
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</tbody>
</table>
**Length of post intervention follow-up period (all data collection points):**

<table>
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<tr>
<th></th>
<th>Intervention #1</th>
<th>Intervention #2</th>
<th>Intervention #3</th>
<th>Control</th>
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</thead>
<tbody>
<tr>
<td>Specify in weeks</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Can’t tell</td>
<td>☐</td>
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</tbody>
</table>

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**Notes:**
Appendix E: Studies Rated Relevant and Quality Assessed as Weak


Appendix F: Not Rated: Studies of Interventions Without Control Groups


