In Partnership With:

CIHR IRSC

SickKids

University of Calgary

Public Health Agency of Canada
Agence de la santé publique du Canada

Alberta Health and Wellness

child & youth

Mental Health Commission of Canada
Commission de la santé mentale du Canada

University of Alberta

McGill

Obesity and Eating Disorders: Seeking Common Ground to Promote Health

A national meeting of researchers, practitioners, and policy makers

November, 2007
Calgary, Alberta, Canada

Final Discussion Document

February 6, 2008

"When minds meet, they don't just exchange facts: they transform them, reshape them, draw different implications from them, and engage in new trains of thought."

– Theodore Zeldin

Table of Contents

Obesity and Eating Disorders, Seeking Common Ground to Promote Health: *A national meeting of researchers, practitioners, and policymakers*

Final Discussion Document

Introduction

Obesity is recognized as a serious public health issue in Canada and other developed countries, and the trends and health consequences are well known. Policy-makers and practitioners face huge and immediate challenges in intervening on this health problem, which has been characterized as an epidemic. Perhaps less well known is the evidence of increased frequencies of unhealthy dieting behaviors in the general population and among young people that elevate risk for *both* eating disorders (EDs) and obesity. These trends suggest that body weight related health issues will present health policy and practice challenges for the next few decades. While researchers and practitioners in the fields of obesity and EDs are actively seeking solutions to these problems, there has been very little dialog across the fields. Health-related messages from the respective fields can be contradictory, and narrowly conceived interventions can have unintended effects. A review of the literature and discussions with Canadian researchers and clinicians in 2006, conducted for the Canadian Women's Health Network gendered response to the Standing Senate Committee on Social Affairs, Science and Technology Report "Out of the Shadows at Last" led to a recommendation for a national network of researchers and practicing clinicians to investigate integrated models for prevention of eating disorders and obesity(1). International experts have also been calling for improved dialog and cooperation, perhaps even integration, across these increasingly related fields to ensure effective intervention strategies at both individual and population levels.

In Spring, 2007, a group of investigators from the Toronto Hospital for Sick Children and the Universities of Calgary, McGill, and Alberta received grants from two CIHR Institutes (Population and Public Health and Nutrition, Metabolism and Diabetes) as well as contributory funding from the Public Health Agency of Canada, the Toronto Hospital for Sick Children, the University of Calgary, the Southern Alberta Youth and Child Health Network and Alberta Health and Wellness to hold a national Symposium. The Symposium, held on November 5th and 6th, 2007 in Calgary, brought together practitioners, policy-makers and researchers from the historically separate fields of obesity and EDs as well as the related fields of nutrition, active living, health services and health promotion/prevention. Its aims were to (1) improve awareness of issues related to body weight and health across fields and disciplines that do not routinely connect; (2) to identify common ground as well as divergent perspectives; (3) to consider the potential for more integrated approaches to intervention, and (4) to lay a foundation for more compatible policies and programs and more collaborative, multi-perspective research.

The Symposium Team

The Symposium was led by a multidisciplinary team of investigators/practitioners from across Canada:

- **Gail McVey**, PhD, C.Psych; eating disorders prevention researcher/practitioner, The Hospital for Sick Children, CIHR Investigator, Community Health Systems Resource Group Scientist, Child Health Evaluative Sciences, Research Institute; Assistant Professor, Public Health Sciences, The Hospital for Sick Children and the University of Toronto; Director, Ontario Community Outreach Program for Eating Disorders
- **Carol E. Adair**, MSc, PhD; epidemiologist and mental health services researcher, Associate Professor, Depts. of Psychiatry and Community Health Sciences, University of Calgary; Adjunct Associate Professor, Centre for Health and Policy Studies, School of Public Health, University of Alberta
- **Janet de Groot**, MD, FRCPC, MSc; psychiatrist clinician-researcher, Associate Professor, Depts. of Psychiatry and Oncology, University of Calgary; Psychiatrist, Regional Clinical Department of Psychiatry, Calgary Health Region
- **Lindsay McLaren**, BA hons., MA, PhD; researcher on the social determinants of obesity and body image, Assistant Professor and AHFMR Population Health Investigator, Dept. of Community Health Sciences, University of Calgary

- **Ron Plotnikoff**, PhD; PA promotion researcher; CIHR Applied Public Health Chair; AHFMR Health Scholar; Professor, Centre for Health Promotion Studies, School of Public Health, and Faculty of Physical Education, University of Alberta
- **Katherine Gray-Donald**, BSc, PhD; nutrition epidemiologist; Associate Professor, School of Dietetics and Human Nutrition, McGill University.

A Program Planning Committee (PPC), including four members of the investigative team and six policy/practice team members, designed the Symposium. PPC members were all experts in public health and/or health services policy in an area related to the issue of body weight and health. Input was also solicited and incorporated from other key stakeholders in our networks. This involvement was intended to enhance the relevance and utility of the products and proceedings of the meeting for policy and practice. Policy-maker/ practitioner team members were:

- **Margaret de Groh**, MA, PhD, Senior Policy Analyst, Public Health Agency of Canada, Centre for Chronic Disease Prevention and Control
- **Janice Popp**, Director, Southern Alberta Child and Youth Health Network
- **Kay Watson-Jarvis**, Coordinator, Calgary Health Region, Childhood Obesity Intervention and former Chair of the Board, Dietitians of Canada
- **Chantal Martineau**, Manager, Food Guide Revision, Health Canada, Policy and Standard Setting
- **Roselle Martino**, Nutrition Consultant, Ontario Ministry of Health Promotion, Chronic Disease and Health Promotion Branch

The target audience for the Symposium was national and intentionally diverse. It included practitioners and researchers working in both prevention and treatment contexts from the distinct ED and obesity fields, as well as policy-makers from broader human health oversight agencies. The speakers (Janet Treasure, Geoff Ball, Linda Smolak, Kim Raine and Dianne Neumark-Sztainer), are leaders in their respective fields and represent treatment and prevention approaches aimed at both individuals and populations. They are also advocates for more progressive, complementary and holistic approaches to research and practice in the context of body weight and health.

A draft version of this Discussion Document was circulated to delegates before the Symposium. Its purpose was to provide background information on obesity and eating disorders as contemporary health problems; to place them in context of broader sociocultural and environmental issues in body weight and health, and to present some new ideas for reconciling discrepancies and working together to address these serious health problems. It was developed using key literature nominated by the investigative team from our respective areas of research as well as recent reviews and major reports on the topics. The document is not intended to be a comprehensive review of all topics from all disciplinary perspectives. Nor is it an attempt to reconcile disagreements among researchers and practitioners about these complex health issues. The views expressed in this report do not necessarily represent the views of all those who attended the Symposium or the organizations that sponsored the Symposium. They simply represent a starting point for active dialog about future directions for promoting health across fields and perspectives.

We wish to acknowledge Sarah Tucker for her enormous effort in managing references and formatting the document, and Manuela Ferrari for helpful comments. Finally, Sarah Collier, Sarah Tucker, Tanille Kosolofski and Gisele Marcoux are sincerely thanked for their capable management of the organizational tasks of the Symposium. Particular appreciation goes to Dr. Margaret de Groh, for her careful reading and editing on points on the evidence base for obesity intervention and recent policy developments.

Part One - Background on Obesity and Overweight, Eating Disorders and Disordered Eating

OBESITY AND OVERWEIGHT

Definitions

Obesity is defined by the U.S. Centers for Disease Control as *"an excessively high amount of body fat or adipose tissue in relation to lean body mass"* (2). Other definitions emphasize obesity as body weight above a standard e.g.(3), and/or link it to health risk e.g.(4). While obesity has historically been considered a moral, cosmetic, and political issue (5,6), recent findings on its association with adverse health outcomes have made it a condition of medical and public health concern (7,8); and the World Health Organization now calls obesity a *"diet related chronic disease"* (9).

The direct measurement of body fat is complex, which has resulted in widespread use of a more indirect measure - the body mass index (BMI) (3,4,4a). BMI is the ratio of weight (in kilograms) divided by height (in metres squared). In adults, BMIs between 20 and 24.9 are considered normal weight; 25 to 29.9 overweight and 30 or greater obese (10). The obesity category is further divided into Class I (BMI 30.0 to 34.9); Class II (BMI 35.0 to 39.9) and Class III (BMI 40 or more) (11). In Canada appropriate reference values are now noted on pediatric growth charts (4), and children are typically classified as obese if their BMI is above the 95th percentile (12).

BMI is a relatively easy and standardized method that is well suited for describing large populations (3, 13); however problems have been noted with its use in children (13,14), in some ethnic groups, some athletes, and in those at the extremes of the height distribution (4a,13-16). The relationship between BMI and health status is imperfect, particularly at the individual level (3,4a,13,17,18). Definitions for weight categories have varied across studies, making valid comparisons imperfect (3,4,19) and official cut-points have also changed, adding to the confusion (7). Kim and Popkin (2006) note that the *"definition of optimal BMI may need to be continuously challenged"* (20, p63) as science advances.

Prevalence

While many estimates of obesity prevalence have been based on self or parent reports of weight and height, which are known to be biased (22), prevalence estimates are increasingly based on direct measurements in representative samples (7). Data from the Canadian Community Health Survey (CCHS), which used direct measurement on a sample of more than 21,000 Canadians in 2004, showed that 36% of Canadian adults (age 18+) were overweight, and 23% were obese (about 5.5 million) (8,11). 15.2% of Canadian adults had a BMI in Class I; 5.1% were in Class II, and 2.7%, in Class III (11). Among Canadian children and adolescents aged 2-17 years, 18% were overweight and about 8% were obese in 2004 (21).

The prevalence of obesity among children has more than doubled in most countries, and nearly doubled in adults, over the past 20 to 25 years (11,23,24). In Canada, the proportion of older children and adults that **is either overweight or obese was half as high in 1981 as it was in 1996 in nine of 10 provinces (23,24). Obesity is also increasing *at a faster rate* – with a doubling now seen every 5 to 10 years in industrialized countries (25). In North America the percentage-point increase in obesity and overweight among children and youth is greater than the increase in any other disease or risk factor over the last century(26). The WHO estimates that at least 400 million people were obese worldwide in 2005 and that number is expected to increase to 700 million by 2015 (27). The large numbers and rapid increases have led obesity to be called the "*most prevalent nutritional problem in the world*" (8, p1).

Risk Factors and Causal Models

While the prima facie cause of obesity is *"an imbalance between the energy ingested in food and the energy expended"* (28,p787), the physiological, psychosocial, and socioeconomic factors underlying this imbalance are incredibly complex. Understanding of the cellular level mechanisms is advancing rapidly (e.g. the discovery of the hormone leptin) (29,30), as is recognition of the brain circuits involved (the hypothalamus and limbic regions) (29b). However, most experts acknowledge that obesity etiology is

"*complex and multifactorial*"; produced in the context of environmental, social and environmental factors (8,19,20,29,29b,31-34). Susceptibility is believed to be conferred by genetics, developmental factors and biology, and a suggestion has been made to consider a component of obesity as a mental disorder in DSM-V (29b), but the increase in prevalence has occurred too quickly to be attributed to genetic changes (29, 32). Jeffery Kluger (2007) eloquently outlines the fundamental dynamics behind increased overweight and obesity in humans, which has been refered to as the 'thrifty genotype hypothesis' (29b), noting that we evolved at a time when a scarcity of food conferred a selective advantage for eating large amounts when food was available and storing energy for times when food was not available. *"We're programmed not only to overeat but also fail to recognize immediately just when we've reached that point"* (35, p34).

In Canada, the likelihood of obesity was very similar for adult men (22.9%) and women (23.2%) in 2004 (11), but frequencies vary by gender for more specific groupings. For example, the prevalence of overweight in men was 42% and 30% in women. However, over twice as many women as men fall in the category of Class III obesity. Obesity rates also vary widely by age with the lowest proportions seen in the age group 18-24, the next lowest proportions in those over 65, and the highest proportions in 45-64 year olds (11), but increases in prevalence are occurring at all age groups and obesity related health problems are being seen more frequently in younger ages (8). Recent analyses of six population-based surveys including data from 1970 through 2004 estimate that obesity prevalence has increased from 8 to 23% and 13 to 22% for Canadian men and women respectively (22).

Increase in obesity prevalence is seen in nearly all countries, but wide variation in rates are documented according to country/region, racial/ethnic group, and socioeconomic status (SES) (7,11,19,20,33,36,37). The highest prevalences are currently found in industrialized countries (especially the U.S.) although rates are increasing more rapidly in the developing world (38,38a). Sociogeographic patterns are complex and underscore the importance of cultural, economic and political factors. For example Flynn (2006) notes that *"in industrially developed countries, lower income families are more vulnerable; while in developing countries, childhood obesity is most prevalent among advantaged groups"* (19,p8). McLaren (2007) highlights more consistent socioeconomic patterning of obesity for women than for men worldwide, which varies depending on a country's development status as well as the indicator of SES being observed (37). In Canada, the limited data that are available indicate that obesity rates among First Nations (particularly children) are of enormous concern (4). Sociocultural and environmental factors will be discussed in greater depth in Part Two.

Health Consequences

Shorter term symptoms associated with obesity include hypertension, serum lipid imbalance, and abnormal fasting blood glucose (20,25,39). When these symptoms co-occur (in context of high waist circumference) they are called 'metabolic syndrome' (40). Obesity has also been implicated in a range of longer term adverse health outcomes including chronic hypertension, insulin resistance, type 2 diabetes, major depression and suicidality, stroke, coronary heart disease, and several cancers; most of which are important causes of premature mortality (8,12,20,22,31,41) as well as all-cause mortality (28,32). In 2000, it was estimated that 9.3% of mortality among Canadian adults was attributable to overweight and obesity (42). The strong associations observed between obesity and mortality are alarming, even though scientists continue to debate the precise nature of the relationship (42a). Other disorders associated with obesity are sleep disorders, orthopedic disorders including osteoarthritis and disc disease, hiatus hernia, gall bladder disease, and endocrine changes/reproductive disorders (20, 25,27,28,39). Impaired immunity is also associated with obesity that is a result of poor nutrition (33).

Psychosocial consequences of obesity among adults are stigma and discrimination, interpersonal difficulties, body dissatisfaction, lower productivity, greater disability, earlier involuntary retirement, mental disorders, and substantially poorer quality of life (11,12,20,28,43,44). Health consequences have been more comprehensively documented for adults, however, conditions such as high blood pressure, abnormal serum lipids, sleep apnea, asthma, fatty liver disease, type II diabetes, and early or delayed puberty are associated with obesity in children and adolescents (3,15,18,19,36). Moreover, the younger age at which obesity develops the greater the risk of continued obesity as well as its long-term adverse

health effects (8,19,32,36). A recent cohort study of 276,835 Danish schoolchildren showed a strong and linear relationship between BMI at age 7 to 13 years and the risk of a fatal or non-fatal coronary heart disease event in adulthood; notably the risk increased across the entire BMI distribution (44a). Obesity in children and adolescents has also been associated with psychosocial outcomes including social isolation, depression, low self-esteem, lower academic achievement, and lower reported health-related quality of life than children with cancer (14,15,33,45,46). A lower income and a lower likelihood of marriage are associated with obesity in young women (47,48). These findings are a sobering reminder that the impact of obesity goes far beyond the physical health concerns.

Costs to Society

Enormous concern has been expressed about the current and future societal costs of obesity and related health outcomes including disability, hospitalization, and long-term care costs (7,8,20). Direct healthcare costs in Canada of obesity-related comorbidities and illnesses resulting from physical inactivity were estimated in two studies to be about $1.8 to $2.1 billion (2.4-2.5% of healthcare expenditures) in the late 1990s (49,50). Even higher estimates (up to 7%) have been reported for other developed countries (28, 31) with up to $99 billion in 1995 for the US for healthcare costs and lost productivity (33). Questions about healthcare system sustainability in the face of increased obesity-related chronic illness have been raised (19).

Subthreshold Conditions and Risk Status

Elevated body weight, even below the clinical threshold for obesity, increases risk for later obesity and for its health consequences. This is important because the number of people in a 'pre-obese' state is high; for example, the estimated prevalence of overweight among Canadian adults is 36% (11). The risk of type 2 diabetes increases as BMI increases even below the clinical threshold for obesity (25,51), as does the likelihood of reporting high blood pressure, and heart disease (11). Psychosocial issues often arise for those with higher body weights even if they do not meet the criterion for obesity. These include weight-related teasing, social isolation, discrimination, poor self-esteem and self-concept (12,52) as well as behavioral responses such as binge-eating and other disordered eating (53-56). The association between body weight and health risk is clearly graduated, with no cut-point representing a clear step-wise change in level of risk. Thus, the health risk significance of body weights above average, but not as extreme as obesity, is vigorously debated. Some authors argue that health is compromised only by extreme obesity, that there may even be some health benefits to moderate overweight, and that it is poor fitness (not fatness) that leads to increased morbidity and mortality (17,57). Others provide evidence that it is the extremes of the BMI distribution (*both* very high and very low) that elevate health risk. For example Bray (2003) notes that the *lowest* health care use and costs are found among those with BMI's in the 26-27 range – values that overlap the low end of the overweight category (28). Others have made similar arguments for mortality (57).

Intervention

Because of the rapidly increasing prevalence and the current and looming costs, obesity has assumed a very high place on many nation's public health agendas (31). There is ample evidence and universal consensus that active living and healthy eating are a big part of the solution to weight-related health problems, but much less certainty about how to achieve these behavioral and societal changes on the necessary scale. Intervention, conceived broadly, includes diverse initiatives ranging from public policy through prevention and direct treatment.

i. Policy

At the policy level, strategic plans to address obesity have been tabled or are under development in most developed countries (7,31). Strategies often include the setting of health targets. For example, the US government's Healthy People 2010 goal is a reduction in the proportion of obese adults from 23% to 15%, and a 50% reduction, from 11% to 5%, is targeted for children and youth (7). In Canada, the Pan-Canadian Healthy Living Strategy calls for a 20% increase in the prevalence of Canadians who are physically active, eat healthy and have a healthy body weight (58). A major report *Addressing Childhood Obesity: The Evidence for Action* has also been compiled by the Canadian Association of Paediatric

Health Centres, the Paediatric Chairs of Canada and the Canadian Institutes of Health Research Institute of Nutrition, Metabolism and Diabetes (59). The report also includes recommendations for research and prevention.

Surveillance of population-level body weight, nutrition and PA trends are critical for tracking population status and progress(8, 15,18,60). Screening of individuals, especially children and in non-clinical settings, is controversial (14). Other policy-level initiatives include increasing research e.g. (8). In Canada, healthy eating has long been promoted through Canada's Food Guide, first published in 1942 and updated in most decades as nutrition science has advanced. The 2007 version also includes a recommendation of 30-60 minutes of daily PA (61). The PHAC publishes a comprehensive guide for promoting PA (62). Professional societies have also released policies (e.g. the American Academy of Pediatrics recommends no more than two hours of quality television for children per day) (49a). The Canadian Paediatric Society produced a guideline on healthy active living with recommendations related to obesity in 2002 (63). A review of obesity-relevant policy guidelines published by authorities or voluntary agencies in the US from 1952 to 1999 found that most represented advice, often passive, directed at individuals (64). Given the frequency and potency of factors now known to drive obesity prevalence, such approaches will need to be bolstered by broader actions.

Increasingly, researchers are drawing on comprehensive and multi-sector views of obesity to guide strategies for comprehensive intervention (7,19,60). For example, the International Obesity Task Force (IOTF) has developed a model which includes global food marketing, the media, food and agriculture, urban design, education, and transport as factors – as a starting point for envisioning a very broad range of policy and regulatory interventions and has also conducted a major review of risk reduction programs and best practices (7,19, 68). Comprehensive recommendations for policy level initiatives have also been made in Canada (60). Such approaches focus on the environment, rely much less on direct individual behavior change and move the loci of intervention beyond the health and nutrition policy sectors(7). Many commentators also advocate for the involvement of many stakeholders, and all levels of government e.g. (26). Examples of such policy level/regulatory actions related to food and nutrition include changes in school curricula, composition of food provided in schools, limits on sales of certain foods (e.g. soft drinks) in schools, food industry regulation (e.g. transfats bans, product labeling, product placement; portion sizes), tax incentives/disincentives, food advertising restrictions or bans (e.g. use of characters and celebrities) and equal time for healthy messaging; and examples related to PA include urban design and building codes to promote walking/cycling, traffic control measures, incentives on exercise equipment and for employer PA promotion programming (7,33,65-67). A recent Canadian example of a policy initiative is the announcement of a ban on sales of certain foods in Quebec schools (69). Other examples of innovative environmental interventions are an initiative in Philadelphia that increased the availability of fresh produce in low-income neighborhoods and an initiative in California that addressed the safety of routes for walking to school (70). Non-profit organizations can also play a role. For example, **Fit 4 Free** promotes a social environment in which people have free access to information, equipment and resources for fitness (71).

The Centre for Science in the Public Interest advocates for healthy private sector policy in the nutrition domain (72). A few voluntary responses by industry to the concern about obesity are noted. For example, under one component of the Canadian Children's Food and Beverage Advertising Initiative (75), first announced in April 2007, 16 food and beverage companies voluntarily agreed to shift their advertising directed to children under 12 to the promotion of healthier dietary choices and healthy active living or to cease all direct advertising to children under 12. In February, 2008(73), specific commitments, to be tracked by Advertising Standards Canada (ASC), indicated that half of the participating companies will direct 100% of their children's advertising to healthier dietary choices defined in accordance with scientific and /or government nutrition standards; and the other half will not direct any advertising to children under 12. Although considered by some to be a step in the right direction, other are concerned that the definition of "healthier dietary choices" remains at the discretion of individual companies and will see such products as Froot Loops, Frosted Flakes and Honey Comb cereal being marketed to children as healthier choices (74). More aggressive approaches such as litigation against food companies (analogous to suits against the tobacco industry) and taxing unhealthy foods have not received much support (76).

Despite the promise of broader strategies, there are challenges. Expertise from multiple disciplines is needed (7,29) as well as coordination across sectors. So far the evidence base for policy and regulatory approaches is sparse (31,36) but it is likely to expand as it has in the tobacco use prevention field.

ii. Treatment

In many jurisdictions obesity has or is being redefined as a condition eligible for fee reimbursement and health insurance coverage to permit greater access to medical intervention (77). For example the Alberta Medical Association introduced a 'BMI modifier' to the physician fee schedule effective July, 2007 to compensate for the potentially greater medical complexity of selected procedures, particularly anesthesia for those with BMIs over 35 (78). Most current treatment approaches for obesity and overweight are centered on medically supervised lifestyle changes (diet and exercise regimens) (8,25,39,79). Behavioral change and cognitive behavioral approaches are increasingly being added to the clinical armament with benefits documented in a systematic review of clinical trials in adults (32,80). While diet, PA and behavioral interventions have been shown to work in the short-term, weight is frequently regained in the long run (81). New anti-obesity drugs (e.g. orlistat, sibutramine) and bariatric surgery for the morbidly obese (BMI >40) or the obese with comorbidity are also used (7,81). The authors of a systematic review of clinical trials of anti-obesity drugs has concluded that there is evidence for longer term modest efficacy of orlistat and sibutramine, but study attrition rates have been high and that more studies with mortality and cardiovascular outcomes are needed (81). So far, the effectiveness and safety of surgical approaches have not been shown to be superior to conventional medical management (25).

The treatment challenges for overweight and obesity have arisen so rapidly, that few physicians have formal training in intervention. Physicians who specialize in obesity today come from other specialties of medicine such as internal medicine and are largely self-taught with respect to obesity management (29). Increasingly, evidence-based guidelines are being developed and the creation of international standards, for example, for the assessment of childhood obesity, have been proposed (79). After some initial concerns, the National Task Force on the Prevention and Treatment of Obesity concluded that there was no evidence that *professionally directed* diets in obese and overweight adults induced eating disorders (82) and a few recent studies have shown no ill effects from *professionally supervised* weight loss regimens for children and adolescents (83,84). New comprehensive clinical practice guidelines for assessment and management of obese adults and adolescents/children that include recommendations for prevention have recently been published in Canada (8). These guidelines include screening overweight/obese individuals for comorbid depression and other mood disorders, and eating disorders (8). They also recommend a multi-disciplinary health team and emphasize the need for a non-judgmental approach. Despite these advances the CPS has expressed concern on the paucity of effectiveness research on interventions for obese children and adolescents (85) and a recent comprehensive systematic review of 18 randomized controlled trials of dietary, PA and/or behavioral therapy approaches conducted in specialist clinics concluded that due to small study sizes and diversity of approaches and measured outcomes, no one specific approach has been shown to be superior to others (79).

Commercial group weight-loss interventions (e.g. Jenny Craig; Weight Watchers) have also been available for many years. These largely involve educational and social support; few have been rigorously evaluated (86,87) and no evaluations have involved children and adolescents (85) Group-based interventions that are sponsored by health service organizations (HSOs) are also becoming more prevalent. The evidence base for these approaches is limited (32). Continued weight gain or regained lost weight is the usual outcome of individual level and group interventions and in longitudinal studies of the general public, in large part because these are self-directed diets (11,81). Much more rigor is needed in all treatment effectiveness studies (79,87).

Many experts are recommending greater emphasis on addressing issues in the individual's micro environment (e.g. family, peers) to support and sustain behavior change and on changing lifestyle for improved health than weight loss per se (13). Such recommendations are grounded in ample evidence that lifestyle change, especially increased PA safely reduces cardiovascular risk and improves quality of life (10,29,32,39). In the case of children, this approach necessitates parent/family involvement (88). For example, in their 2006 Position Paper, the Society for Adolescent Medicine stresses that effective

treatments include not only helping adolescents with suitable food energy and nutrient intake, but also "*address social and cultural contexts along with physical and psychological characteristics of the adolescent and families"* and that healthy weight management programs also promote body acceptance, provide psychosocial support and improve self-esteem(89,p785). Measurement of psychological and social outcomes is increasingly being recommended for intervention research (79).

'Health at Every Size' is a broad movement that recommends that body weight be de-emphasized in weight loss interventions, in favor of body acceptance, well-being and fitness as the recommended foci ('health from the inside out') (90). In a recent clinical trial, the effectiveness of this new 'health-centred' approach that included self-esteem and normalized eating components (response to body cues to hunger and satiety), and a focus on enjoyment of PA was compared with a 'traditional diet group' based on weight monitoring, controlled eating and brisk exercise. There were no differences in weight outcomes at 24 months follow-up, but the health-centered approach did better on physiologic measures of health, and on increased or sustained PA. The health-centred group was also more satisfied with the program and had less depressive symptoms (91).

In contrast, Wadden and his colleagues, in a randomized controlled trial in obese women with no eating disordered behaviours at baseline, compared three different experimental conditions (1000 kcal/d diet using meal replacements; 1200-1500 kcal/d balance deficit diet; nondieting approach which discouraged energy restriction) (91a). Outcome variables included binge eating episodes, self-esteem, symptoms of depression and body image, as well as weight loss. The researchers ensured that those who assessed participants' on all measures were blinded to experimental condition. No differences were found between groups on outcome variables and at the end of the study (65 weeks), both energy restriction groups lost between 8-10% of their body weight on average, compared to the "nondieting" group that exhibited an average weight gain of 3% from baseline. These and studies like them are beginning to unbundle the successful ingredients of obesity/overweight intervention programs at the individual level.

The benefits of weight loss for adults (even 5-10% of body weight) have been amply documented for reducing levels of clinical risk factors and in improving well-being (8,20,25,28,32,81,81a). However *"many studies have failed to distinguish between voluntary and involuntary weight loss or fat loss and overall weight loss"* (81,p2) and the effects of weight loss cannot be separated from the effects of improved nutrition (including appropriate levels of energy intake) and greater PA (81a). Many argue that individual level treatment cannot adequately address the problem of obesity, that there will never be enough healthcare resources for the current need, and that the problem will just continue if intervention does not arrest the environmental causes (7,66).

iii Prevention

Overweight early in life confers high risk for continued weight gain into adulthood and increases risk for poor health outcomes relative to later onset of excess weight gain (19,32,33,36,92-94). Because of the issues discussed in the previous section, few would argue with the dictum "*prevention is better than cure*" (26,p2). In obesity, prevention is now an international public health priority (12,36,52) and many new prevention programs have been developed and implemented in recent years (95). Examples of initial types of interventions that have been used are breakfast programs that include instruction on healthy choices and food preparation for disadvantaged children (96); workplace fitness programs; and daily physical education/activity programs in some parts of the globe e.g. (97).

Schools have been the setting of choice for most healthy eating and PA interventions (19) because of the convenient access to large numbers of young participants, including their social networks (98,99). The CDC has published a document outlining 10 school-based strategies (14). Many programs have been directed at adolescent girls and few specifically address boy's needs (19,80). Despite increasing recognition of earlier critical periods (perinatal, infancy and the pre-school) for the development of adiposity, practical barriers, and lack of experience with interventions at these points in development limit understanding of what might be possible (19,100, 100a). Interventions proposed for the home setting for pre-schoolers include reducing television viewing and modification of child and family diet (e.g. sweet beverage and fast food consumption). Health authorities in Australia have proposed a multi-sectoral

planning process to build a portfolio of interventions for children from birth which will engage the community, parents, primary care providers, childcare workers, nurses and pediatricians (100).

The evidence for the effectiveness of current obesity prevention programs is characterized as 'mixed to modest' (80,99,101); although many have shown at least short-term change in positive directions. In a major systematic review of controlled prevention trials, Summerbell et al. (2007) concluded that programs have more promise in improving healthy eating and PA than in preventing weight gain (36). A Canadian systematic review published in 2004 by Casey, Crumley et al. found no strong evidence favoring any specific childhood prevention approach, but PA and nutrition programs were felt to be promising (88). A finding that interventions of short duration can work (80) seems to conflict with broader recommendations for greater intensity and longer duration of prevention programs (19,26). Youth participants may be unconvinced by interventions that emphasize health risks since, as in smoking, these are remote (26). Messages may have been too complex in some programs (80). Many health education and prevention programs have been criticized for their over-emphasis on weight control, and concerns around unintended effects on body image and self-esteem have been raised (52). So far, few programs have considered psychological or well-being as outcomes or have focused on supportive environments (19). A shift toward a goal of fitness, nutrition and self-esteem rather than weight is advocated by many (12,19,85). Weight loss or failure to gain is also questioned as an appropriate outcome measure for interventions for growing children (79). The Society for Nutrition Education has published a set of guidelines for childhood obesity prevention programs that emphasize a focus on health (not weight), a nurturing, accepting environment and the avoidance of harm (102).

Many experts recommend broader-based programs that go beyond prevention in individuals and groups and use health promotion frameworks that propose multi-sector, multi-level strategies delivered in many settings by multiple disciplines with stakeholder participation and which address social and environmental risk factors (7,12,19,26,29,36,52,60,80,95,98,103). Much more research, as well as more rigor is recommended for obesity prevention research (36,80,88,95,101,103), and promising studies are beginning to be reported. For example, Veugelers (2006), showed that schools in Nova Scotia that had healthy lunches, a 'no junk' policy, more opportunities for PA (including access to school gyms after school), integrated curricula, and involvement of parents and community had lower rates of obesity than schools without such initiatives (104).

Examples of recent innovations in obesity prevention programming are:

- **Planet Health** is a comprehensive curriculum for grades 6 to 8 that integrates lessons and activities related to healthy living into the language, arts, math, science, social studies, and physical education developed by Dr. Steven Gortmaker at the Harvard Prevention Research Centre on Nutrition and PA (105). Because of its focus on all school children regardless of weight status, this program represents universal prevention.
- **New Moves** is a program for overweight/obese adolescent girls aged 14-19 that uses an environmental approach to increasing PA, healthy eating and decreasing excessive food intake (such as in fast food restaurants, movie theatres), media literacy, and reducing exposure to media (e.g. reducing television time through after school). The program provides social support, goal setting, and individual counseling and incorporates psychosocial aspects such as body esteem, media literacy and avoidance of unhealthy dieting in an alternative physical education class setting (55,106). Because of its focus on "high risk" girls, this program represents targeted prevention.
- The **5-2-1 Go! Intervention** (which includes the Planet Health curriculum) and promotes PA and healthful nutrition has been shown in a recent randomized controlled trial to *reduce* unhealthy weight-control behaviors, in girls (but not boys) in grades 6 and 7 in Massachusetts (107,108).

Summary of Background on Obesity and Overweight

In summary, the seriousness of the growth in obesity rates worldwide is questioned by few. The *increase in obesity and its health consequences are real, and the scientific community needs to provide more responsible solutions to this serious public health concern"* (20, p61). *"Even within public health - where the population perspective tends to be the rule – we sometimes have difficulty escaping from the culturally determined boomerang in which all solutions somehow lead back to educating individuals to make different choices* (7, p301). The challenges ahead in designing effective interventions on a large scale are massive.

EATING DISORDERS AND DISORDERED EATING

Definitions

Another set of health conditions related to body weight and health are the eating disorders (EDs), which include anorexia nervosa, bulimia nervosa and eating disorders not otherwise specified (EDNOS). These are psychiatric disorders characterized by severe disturbances in eating behaviors and attitudes (109), including weight preoccupation, fear of fat, and a sense of self that is unduly influenced by weight and shape concerns. The following definitions come from the American Psychiatric Association Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) (109).

Anorexia Nervosa (AN) is a serious psychiatric disorder that often leads to inpatient hospitalization. It has four defining characteristics a) persistent low body weight (< 85% of normal for age and height) b), intense fear of gaining weight despite being underweight, c) distorted perception of one's body weight, size, and shape, and, d) in women, absence of menstrual cycles that otherwise would have occurred. AN has a restricting sub-type (food intake minimization alone) and a binge-eating/purging type (the person engages in self-induced vomiting or the misuse of laxatives, diuretics, or enemas). Bulimia Nervosa (BN) is characterized by recurrent episodes of binge eating (a relatively large amount of food in a short period of time and a sense of lack of control over the eating) followed by recurrent inappropriate behaviors to prevent weight gain including self-induced vomiting, fasting or excessive exercise, misuse of laxatives, diuretics, enemas or other medications. DSM IV criteria requires that both binge and purge behaviors occur on a frequent basis weekly and the evaluation of self must be unduly influenced by body shape and weight. Subtypes are purging (use of self-induced vomiting or misuse of products) and non-purging (use of fasting or excessive exercise but not self-induced vomiting or misuse of products). Excessive exercise (EE) (also called obligatory exercise, compulsive exercise or anorexia athletica) is classed as a purging behavior and is defined as exercise that significantly interferes with important activities, occurs at inappropriate times or in inappropriate settings, or continues despite injury or other medical complications" in the DSM-IV. Others characterize it as long duration, high frequency exercise which is aimed at changing weigh or shape, its reduction or postponement is associated with guilt, and it continues despite injury or exhaustion (110). EE can cause cardiac stress, musculo-skeletal damage, muscle wasting, disrupted hormones, bone loss, anxiety and depression and social withdrawal (111).

EDNOS is a category used for individuals that do not strictly meet criteria for AN or BN, usually because one criterion is missing (e.g. lack of menstrual periods) or behaviors are of lower duration or frequency. The EDNOS category also includes binge eating disorder (BED) which is currently under study for inclusion as a separate category in the DSM. The proposed criteria for BED are recurrent episodes of consumption of large amounts of food in a short period of time and a sense of lack of control over the eating. An episode may include eating rapidly, until feeling uncomfortably full, in the absence of hunger, and feeling disgusted, distressed, embarrassed or guilty. BED also has criteria for frequency and a requirement that the compensating behaviors of BN are *not* present. Formal diagnostic criteria are not fully applicable to younger adolescents (112).

The relationship between body weight and diagnosis in EDs is more complex than many realize. AN (by definition) is associated with low body weight and wasting but the full range of body weight is seen in BN sufferers, and most have normal range BMIs. BED is usually, but not always, associated with overweight and obesity (113).

Prevalence

Prevalence estimates for AN are usually reported for age/sex subgroups. For young females in Western Europe and the United States the estimate is 0.3% with .37 to 1.3% meeting the definition of subthreshold AN (one criterion short of threshold) (114,115). A very recent study provides evidence for Finnish women aged 15-19 that the frequency of AN may be nearly twice as high as previously estimated, due to underascertainment (116). The prevalence of BN is about 1% for women and .1% for men in Western countries (115). ED conditions that do not quite meet all diagnostic criteria are more frequent – and range from 1.5 to 5.4%. Estimates of BED prevalence range from .7% to 3% in the general population (114, 115). Among community samples of obese individuals, a prevalence of BED between 5% and 8% has been documented (114). Canadian population-based data on the prevalence of BN comes from Garfinkel

et al. (1995) for BN only which at that time reported a lifetime prevalence of 1.1% for females and .1% for males 15 years and older (117). The most recent and comprehensive data from a large representative US sample suggest a lifetime prevalence of .9%, 1.5% and 3.5% of AN, BN and BED respectively in adult women and .3%, .5%, and 2.0% among adult men (113). Across studies, the prevalence of all EDs is in the range of 2-3% of the population and 5% of young women. These proportions would translate into a non-trivial 600,000 to 990,000 Canadians with symptoms sufficient for an ED diagnosis at any one time.

Currin et al. (2005) have reported that while the incidence of AN appears to be stable, a 3-fold increase in presentations of BN in primary care settings in the UK between 1988-1993 has been documented, with continued increases through 1996 (118). Recent population-based data (adults only), published in 2007, provide stronger evidence of increased prevalence of BN and BED in recent birth cohorts (113). Data from other studies confirm that the incidence of AN, after an increase in referrals for care between the 1970s and 1990s, is stable (113,119,120). Few data are available, on the frequency over time of BN and BED in children and adolescents (114).

It is important to note that, in contrast with overweight and obesity which can be measured more directly, it is challenging to get accurate population-based estimates of the frequency of EDs for several reasons. Early studies were conducted largely in selected clinical or services samples which detect only those presenting for care. Only more recent studies have been appropriately population-based. However, even these population-based surveys have limitations. First, they do not always cover the full age range. For example, the recent nationally representative survey reported by Hudson et al. (2007) included only those 18 years and over – missing most of the age group with the highest first presentations of EDs (113). In addition, secrecy and denial are common features of these disorders – resulting in likely underestimates by self-report in such surveys.

Risk Factors and Causal Models

Eating disorders have multiple and complex biologic, psychological and social causes (121). Most of the current research on etiology has examined AN and BN; little is known about BED. With respect to age, peak onset of EDs is 15-19 years but children are presenting at ages as young as 7 and 11% of 959 cases at one academic centre in the U.S. were between age 8 and 13 (122). New cases are also being identified in mid- and late-life (114). Currin (2005) reports that the highest risk of AN and BN is in the 10-19 year old age group (118). In Canada, hospitalization rates are highest in the 15-19 year old age groups, followed by the 10-14 and 20-24 year old age groups, according to the Canadian Institute for Health Information (121). Women and girls predominate in both clinical and community eating disorder samples, with males representing only 8-15% of cases (113,114). A recent large population-based survey found that men made up nearly 25% of cases of AN and BN in adults in the community (113). The authors speculated that this may be a result of the reluctance of men to present for care, but also cautioned that it might have been an artifact of unstable estimates due to small numbers. Boys and men represent a larger proportion of BED cases (40%) and BED is also more spread across the age range (121,123). EDs have long been considered a Western phenomenon because most reports have come from Western countries (16). More reports about EDs are now coming from Asia and other parts of the world e.g. (124). Urban vs. rural residential status has also been documented as a correlate of BN but not AN (125). Initially EDs were considered to be more prevalent among affluent social groups. More recently, patterns of ED related attitudes among recent immigrants and varied rates among racial/ethnic and national groups and studies documenting presentation across the range of SES in community samples (16). It is most correct to say that the jury is still out on the relationship between SES and EDs (126-128) but the findings across gender, age, geography and immigration status still underscore the role of sociocultural factors (129,130).

Important biological risk factors in individuals include genetic, metabolic, appetite, CNS serotonin activity, and related factors (123,131-133); all require further study. Current research on the complex biological mechanisms of AN is summarized by Treasure, (2007) (131). Psychological risk factors for EDs include poor body image, low self-esteem, maladaptive eating attitudes and beliefs about shape and weights, and overvaluation of appearance (85). Developmental factors include identification with body-concerned relatives or peers, aversive mealtime experiences, childhood eating and digestive problems, and prior

trauma, including childhood sexual, physical and emotional abuse and combinations of abuse (133-135). Parental psychiatric disorders have specific relationships with AN and BN but family functioning and attachments styles have not been established as risk factors in longitudinal studies (133). Pubertal status has not been demonstrated as a risk factor for disease although it affects symptom timing (133). Social influences are maladaptive family attitudes, peer group weight concerns, negative body image, pressures to be thin, body-related teasing and negative comments from family, athletic pursuits, and cultural values assigned to body shape and weight (12,133,136). Unhealthy dieting behavior confers a 5 to 18 fold risk for development of an ED, but it remains to be determined whether such dieting is a cause, trigger or prodromal (85,133,137). Interestingly, the current evidence does not support higher BMI as a risk factor (133). A host of other indirect factors such as impulsivity, identity, prior neglect, social isolation and media exposure have also been implicated (121).

Southgate, Tchanturia and Treasure (2005) provide a comprehensive biopsychosocial model of the risk factors for AN and BN and for the development and maintenance of the disorders (138). A comprehensive summary of the current evidence for risk factors is provided by Jacobi (2004) (133). A thorough review of incidence rates, historical evidence, and cross-cultural evidence suggest that BN has a more sociocultural etiology than AN (139). Evidence is mounting in support of theorized links between sociocultural influences and biology in EDs e.g.(137). Steiger (2007) highlights these complex mechanisms: *"Binge eating is widely believed to represent an eventual erosion of appetitive controls following prolonged physiological and cognitive dietary restraint" and that it and other bulimic syndromes are "fairly direct responses to cultural pressures to maintain excessive control of appetitive and body weight*" (123,pp222-224). He goes on to note that *"dieting, particularly in vulnerable individuals, is likely to affect the activity of virtually all neurotransmitter, neuropeptide and hormone systems"* (123,p225). Thus, the thinking about ED etiology has advanced from dysfunctional parenting, to exclusively socioculturally driven phenomena through to a more sophisticated modern conceptualization. *"Ultimately, eating disorders have always demonstrated to us the ways in which social pressures activate constitutional vulnerabilities and the ways in which biological factors influence social experience and reactions to developmental risks"* (132,p210).

Health Consequences

Although EDs are sometimes overshadowed by obesity as a prominent public health concern, they too carry significant risk for morbidity and mortality (113). Other psychiatric conditions often accompany the EDs with major depression, anxiety, substance use and personality disorders being the most common (ER) and suicide is also a tragic outcome (121). Medical complications arising from EDs include cardiovascular problems, electrolyte imbalance and kidney failure, endocrine and metabolic abnormalities (especially osteoporosis), growth impairment, skin effects, dental complications, fertility and perinatal problems and occasionally neurologic effects (16,112,140,141). Accumulating evidence shows that medical complications are different in adolescents and adults, underscoring the importance of early intervention (141).

In modern conceptualizations, the disease burden of disorders at the population level is measured not only by frequency and death but also by chronicity and disability (142). While relatively low in frequency, AN is a very serious condition. A young woman with AN is 12 times more likely to die than other women her age without anorexia (142a) and a high mortality rate in AN has been confirmed in a Canadian population (143). At least 1/3 of individuals with AN in treatment will have repeated relapses and hospitalizations (144). BN and BED are more prevalent, and all EDs can become chronic illnesses, resulting considerable psychological distress and impact on functioning, role impairment (113), and quality of life (145-148). Because of its strong association with obesity, BED can have the same health consequences.

Costs to Society

EDs are not inconsequential with respect to costs, although the costs of these disorders are relatively under-researched and most studies have tended to overlook privately paid and other outpatient costs (149). In a recent systematic review, health services and treatment costs alone were estimated at 4.2 million UK pounds (1990), 65 million Euros for Germany (1998) and 22 million AUS for Australia in

1993/94 (149). Costs for AN were 6.5 times those for BN in Germany, reflecting the acuity and severity of AN (149). Canadian data on ED costs come from a study in British Columbia that focused on long term disability payments among sufferers of AN. The authors estimated that these costs could be as low as 2.5 or as high as 101.7 million dollars depending on the assumptions used in the estimates, and noted that this value was up to 30 times higher than the cost of tertiary care treatment services (150). In recent years, the limits of access to treatment programs in Ontario, has lead to dramatically increased out of country costs for funding ED treatment from approximately $0.5 million in 2000/2001 to 5.6 million in 2004/2005 (151). Age-adjusted annual inpatient and outpatient costs for individuals with AN and BN have been estimated to be higher than those for schizophrenia (152). There is no information available on non-health care costs; early detection and effective treatment would greatly reduce costs (149). More comprehensive data on current health-care resource use patterns for EDs is called for (149). Burden on the family has also been documented to be substantial; this includes disruption of family life, psychological distress, general mental health, vitality and emotional role functioning, social isolation and financial burden (153-155).

Subthreshold Conditions and Risk Status

Individuals are diagnosed with an eating disorder generally, only if they meet *all* of a set of diagnostic criteria and their symptoms are very serious, frequent and persistent. Lesser forms of all these disorders (also called subclinical disorders) are very common presentations to service settings, including some acute care admissions. Their prevalence is difficult to estimate but it is suggested that about 6% of women (and a smaller proportion of men) have a diagnosed or subclinical ED (156). It is also important to note that secrecy and denial are key characteristics of EDS, particularly BN, so they may go unrecognized.

Le Grange and Loeb (2007) note that 'subsyndromal EDs' in children adolescents are not only clinically significant in their present state, but may represent legitimate candidates for preventive efforts in light of *"… their risk of progression and the detrimental effects on outcome of delaying treatment; and the refractory, severe nature of EDs once the diagnostic threshold is crossed*" (144,p32-33). A nontrivial proportion of diagnosed BN cases will progress to AN and the reverse is also frequently seen (112,144). More importantly, some reports suggest that up to half of those with subclinical conditions will develop a full disorder (144). Health impairment, physiologic complications, psychological distress and psychopathology are often present in individuals with subthreshold conditions (144). Burns (2004) reports that repeated binge eating and purging can result in serious renal, oral, gastrointestinal, cardiovascular and endocrine complications as well as considerable distress (17) even if the behaviors fail to meet diagnostic thresholds. Assessment approaches are imperfect and cut-points for current disorders are largely arbitrary (117). In reality ED symptoms and behaviors lie on a full continuum from mild risk behaviors through diagnoses of life-threatening severity, with the subclinical conditions at the intersection between them.

Dieting is a common behavior; in one study in the 1990s, more than half of American adults reported trying to control or lose weight (7). Only about 2% of the *total adult* population in Canada (men (.5%) and women (2.9%)) aged 15 and over admitted to symptoms that *met criteria for an eating attitude problem* in the CCHS 1.2 in 2002 (157). A recently presented, but as yet unpublished study of the general population in Australia has documented a doubling of the prevalence of disordered eating, including extreme fasting and purging, in the last 10 years (from 2% to 5% between 1995 and 2005) as well as a notable increase among men (158).

The prevalence of weight concerns and related behaviors in children and youth and in particular among females is much higher (33,52-54,56,85,156,159,160). While some adolescents might adopt healthy strategies for weight loss such as better food choices and increased PA (161), the current evidence suggests that *unhealthy* dieting behaviors are disturbingly common (161,162). While many of these attitudes and behaviors may not raise a level of concern that would suggest even a subclinical diagnosis of an ED – they represent elevated risk (at least eight times) for EDs as confirmed in longitudinal studies (133,162-164).

Two broader classes of concepts are measured in this literature. *Attitudes* include desire to lose weight, concern about weight and shape, body dissatisfaction, low body esteem and poor body image (13,85). *Behaviors* measured include a range from less extreme (skipping meals, fasting, crash/fad and chronic dieting) to more extreme unhealthy weight control practices (self-induced vomiting, laxative, diuretic and diet pill use, excessive exercise and smoking for the purpose of weight loss) (13,85,98,159,161). These behaviors are termed 'disturbed eating' or 'eating disturbances' (54).There is general agreement on the behaviors classed as extreme but imperfect consistency in measurement (85,161). Even so, there is sufficient congruence across studies to recognize that the problem is not trivial.

A WHO study 'Health Behaviour in School-Aged Children' (2002), reported that the proportion of students rating their body as 'too fat' was 23.2% and 43.8% of girls in grades 6 and 10 respectively. The corresponding proportions for boys were 20.1% and 19.9%. Those reporting that they felt they were 'too thin' were 13.8% and 7.2% for girls in grades 6 and 10 and 15.2% and 26% for boys. The proportions reporting that they were presently 'on a diet' were 10.5% (grade 6) and 28.9% (grade 10) for girls and 8% (grade 6) and 9.1% (grade 10) for boys (165). Canadian data, collected in the National Longitudinal Survey of Children and Youth in 1988/89 showed that one third of 12-15 years olds were unhappy with their appearance and 25%, 44% and 56% of normal, overweight and obese youth, respectively were currently trying to lose weight (166, 167). A prospective follow-up study of over 12,000 9-14 year olds in the US documented 1% and 6% increases in weight concerns and 1% and 2% increases in constant dieting for boys and girls in a one year period (1996 to 1997) (168). Simply trying to lose weight and weight change within a normal range may not be cause for alarm unless unhealthy strategies are being employed. Healthy strategies are used by the majority of adolescents (159). However, *unhealthy* weight control behaviors were reported by 57% of girls and 33% of boys and *extremely unhealthy* behaviors were reported by 12% girls and 5% of boys among 4476 adolescents in public schools in Minnesota (159). This study also found the behaviors to be more prevalent among overweight youth with extreme behaviors reported by 18% of very overweight girls and 6% of very overweight boys. Recent Canadian population-based studies confirm that weight concerns begin at an early age and proportions with disordered eating attitudes and behaviors increase with age (169-171). Nearly a third (29.3%) of girls as young as 10-14 years of age, report dieting to lose weight despite being *within a healthy weight range* (169,170) and 10% were using other extreme weight loss methods (169,170). Among females in a slightly older age range (12-18 years), only 4% of girls reporting binging and 6% reporting purging had ever been evaluated or treated for these serious behaviors (171). A review of seven studies by the CPS indicated that 4-12% of adolescent girls use vomiting to avoid weight gain or lose weight and that a broader class of unhealthy dieting behaviors (laxative and diuretic use, fasting, skipping meals, diet pills, crash diets and smoking) are present in up to 18% (85). The prevalence of use of products to improve muscularity or strength is estimated to be 4.7% among boys and 1.6% among girls in a large U.S. sample of 12-18 year olds (172). Similar rates of weight concern (25-50%) weight loss attempts (20-66%) and extreme dieting behavior (about 10%) among children and adolescents have been documented in US, Australian and British studies (33,85,161). Longitudinal studies are beginning to improve our understanding of the complex patterns of risk for development of these behaviors (56,173-176).

Unhealthy weight-related attitudes and behaviors are not only found among adolescents. A non-trivial frequency of a desire to be thinner, related poor self-esteem, and weight loss attempts have also been documented in children as young as age five (85, 177-180). At mid-life, weight dissatisfaction is also ubiquitous, and has been endorsed by 80% of women and over half of women of normal body weight (181). Further, women with poor body esteem are more likely to avoid everyday activities such as social situations and public change rooms (181).

Overweight, body dissatisfaction and low self-esteem are strong predictors of unhealthy weight control behaviors (85,182). Such behaviors are often associated with other health-compromising behaviors or conditions such as alcohol and drug use, depression and suicide (85), and smoking in youth. Smoking for weight control is reported by 12 -18% of adolescent girls (85). Unhealthy weight control behaviors are also common among teens with certain chronic illnesses (diabetes, ADHD, asthma and epilepsy) (85). Psychological consequences of unhealthy dieting practices include food preoccupation, distractibility, irritability, fatigue and a tendency to overeat or binge, and elevated risk for depression, and physical consequences include electrolyte disturbances, cardiac dysrythmias, nutritional deficiencies, menstrual

irregularity, long-term risk of osteopenia and osteoporosis as well as any medical complications of purging behaviors (54,85,161).

Two very important concerns arise from these findings. First, unhealthy weight control behaviors are more frequent among overweight and obese adolescents, but also occur at concerning levels among *normal weight* adolescents. This is attributed to body image distortion – the phenomenon that has young people perceiving themselves as 'fat' even at normal weights (85,159,183,184). While mild body dissatisfaction in overweight individuals might in theory be expected to motivate healthy weight loss behavior, it has now been shown to be counter-productive to adopting healthy weight-related practices (174). Second, self-directed, unhealthy dieting is known to be ineffective for sustained weight loss (85); and evidence, including from longitudinal studies, is now accumulating that dieting to control weight, and/or binge eating, and diet pill is use is not only associated with an increased risk of EDs, but also *increased (about three times) risk of overweight and obesity* (54,185-189). Very recent studies have begun to illuminate the possible mechanisms for this finding. The types of dieting behavior and how they are measured seem to be important in the association (190-192).

Intervention

i Policy

Interventions *at the policy level* that are specifically oriented to the prevention of EDs and its antecedents (body dissatisfaction, weight concerns, unhealthy dieting) are rare. In Canada there are relevant national policies on healthy eating and active living (as noted in the obesity section) which encourage individuals, generally, to make healthy choices that relate to body weight. A recent CPS Position Paper on Adolescent Dieting has provided guidance for physicians (85); in particular it urges providers to take the time to discuss normal body changes, healthy eating and PA as *alternatives* to dieting with adolescents, to explore weight-related concerns and to convey the message that bodies come in all sizes. Literature on screening general populations or primary care populations for disordered eating or eating disorders that might influence policy is just emerging e.g. (193-195).

A few policy level initiatives can be found in other countries. In Victoria, Australia a recent parliamentary inquiry recommended that a code of conduct for the media be developed relating to portrayal of images that accurately reflected individuals in the community (156). In Spain and Italy fashion models have been disallowed from working if their BMI falls below a minimum standard after some highly publicized deaths, and such a ban has also been recently instituted in Canada for 2007 Montreal Fashion Week (196). In the US and UK fashion industry discussions have also led to recommendations such as screening models for EDs, but they fall short of restrictions on BMI (197, 198). Concerns about extreme thinness in models led to guidelines by the U.K. Independent Television Commission that were intended to ensure that unhealthy eating attitudes are not encouraged or that underweight is not suggested to be desirable but this initiative is sponsored by the advertising industry, is complaint based and many feel that it has not had much impact (199).

Recent advertising campaigns from the corporate sector that promote healthy body esteem are of interest in a discussion of societal level interventions. Perhaps the most well known of these is the Dove® "Campaign for Real Beauty" which is described as a *"brand pioneer, blasting through decades of female beauty stereotypes"*. The approach is characterized as classic 'cause branding' and the campaign's mission is to *"offer a broader, healthier and more democratic view of beauty"*. Elements of the campaign that go beyond product advertising include grants to support partnerships on the issue, and research (200). Profits are noted to have been substantial since the campaign and there is much public discussion about it which ranges from praise to cynicism. Nike® and Fruit of the Loom® are two other companies/brand names that are including advertising messaging supportive of body size diversity (201).

Current recommendations for possible policy-level interventions to prevent EDs or disordered eating target either school policies or the media. Suggestions include: improvement or introduction of school policies for handling weight-based teasing/harassment, incorporation of weight-based stigma in diversity instruction, general media literacy instruction, and assisting educators with appropriate weight related communications with their students (66, 202-204).

Ontario is an example of high-level proactive knowledge translation of best practices in the treatment and prevention of EDs. Activities have included local workshops for clinicians, teachers, school board staff and public health professionals (205), online programming for elementary school teachers that fits with the Ontario Ministry of Education's learning outcomes (206-208), the development of manual and video resources (209,210), the training of local public health practitioners to facilitate school-based prevention interventions (e.g. Girl talk Peer Support groups) (211,212); and resources/training activities to promote positive body image among female athletes, parents and coaches in sports organizations (213, 214).

Several experts advocate for initiatives that would require or at least urge the media to limit portrayal of extremely thin individuals in articles and ads (66,215). Over 10 years ago, Katherine Battle and Kelly Brownell (1996) wrote that *"fundamental changes are necessary in the body image messages conveyed to all segments of the population, but especially to females, and in the way individuals perceive self-worth in relationship to body weight*" (66, pp762-763). They go on to suggest that general bans on alcohol and tobacco advertising and the more regulation of food advertising to children are precedents for regulatory approaches to diet, cosmetic and clothing ads. Suggestions for voluntary or regulatory changes to media messages include presentation of diversity in body shapes and sizes, discouragement of unhealthy dieting, and avoiding glamorizing images of drastically underweight individuals (204). Currently there are no known specific guidelines for the media on the appropriate portrayal of individuals with eating disorders or the proper use of ED related terms (199).

Both direct pressure on magazines that use extremely thin models in advertising and indirect pressure (lobbying companies to withhold advertising revenue from magazines) have also been suggested as change strategies (216). Such general advocacy has worked in some instances. For example, the National Association for Anorexia Nervosa and Associated Eating Disorders (ANAD) successfully challenged Hershey® to stop using the advertising slogan 'You can never be too rich or too thin' (216) and more recently also convinced Apple® to remove a similar tag line for the iMac computer (198). Battle and Brownell conclude that "*control of exposure to messages an area of enormous potential for both fields"* (i.e. obesity and ED prevention) (66, p763).

Ii Treatment

Providers report that demand for treatment services for EDs is high and waiting lists are growing. Reports from general population studies indicate that there is considerable undertreatment of EDs with the minority of cases accessing treatment (113,115). A review of the best current evidence for ED treatments was published as a major Evidence Report of the Agency for Healthcare Research and Quality by Berkman et al. in 2006. The authors systematically reviewed over 150 studies on treatment and outcomes for AN, BN and BED. The authors concluded that for AN, research on the efficacy of medications was inconclusive, although some types of family therapy were promising and cognitive behavior therapy (CBT) had utility in reducing relapse risk after weight restoration. For BN, there is evidence for CBT and for one medication (fluoxetine) in decreasing behavioral and psychological symptoms (114). CBT was also found to reduce binge eating, but not to result in weight loss. In BED; medications may also have a potential role. The authors also concluded that current research on the treatment and outcomes of EDs was of "highly variable quality" and they underscored the need for more rigorous study designs. These and other authors also emphasize the urgency of grounding both existing and new treatments in evidence (114,217) and of insuring that the evidence for current treatments is used in practice. Clinical practice guidelines for the treatment of patients with EDs have been published by the American Psychiatric Association, the National Institute of Clinical Excellence and the Royal College of Psychiatrists in the UK and in Australia and New Zealand (218-220), as have position statements by the Society for Adolescent Medicine (112) and the American Academy of Pediatrics (112a) A UK study has documented little awareness or use of the UK guidelines, at least in primary care settings (219).

For the past few years, ED experts have begun to call for more holistic approaches to treatment *"To focus merely on symptomatic relief from 'not eating', as occurs with some forms of hospital care, is primitive."* (131,p212). Greater understanding of the etiology of EDs is leading to proposals for more customized treatments for specific ED presentations but the proposed approaches have yet to be implemented and

evaluated (123,131,132). Many are proposing the expansion of definitions of treatment success and outcome to include functioning and quality of life (145,221,222). Despite these advances, Treasure (2007) sums up the current state of the science on ED treatment*: "the evidence base to guide treatment is thin"* (131, p212).

Iii Prevention

Prevention of disordered eating and EDs is challenging because interventions must counter the intense pressures of a sociocultural environment that undermines positive body image and at once promotes both overeating and restrictive dieting (66). There have been encouraging advances in prevention programs for EDs in the last decade, including those aimed at at-risk individuals or groups (54,156). Program types that have been developed and evaluated include school curriculum based interventions, media literacy and advocacy approaches (223), interactive web-based programs (224-227), whole school approaches (228), ecological/culture change approaches in high risk settings (e.g. a ballet school) (229), and interventions based in community youth groups such as the Girl Scouts (54). The content of interventions typically includes one or more of (1) nutritional knowledge and weight-related attitudes; (2) gender equity, empowerment and self-esteem (160, 230-233); (3) media literacy and advocacy (54,156,223); and, (4) lifeskills, decision-making, coping, assertiveness and resiliency (54,211,212,223,233,234). Programs usually align with one of three theoretical approaches – the Disease-Specific Pathways approach, the Non-Specific Vulnerability-Stressor approach, or the Feminist Empowerment-Relational model (223). Interventions are also classified according to participant target – universal (i.e., programs that foster resilience and reduce risk among nonsymptomatic populations), selective (i.e., programs for nonsymptomatic individuals who are considered at risk because of person variables or contextual factors), and targeted (i.e., programs that identify early signs of maladjustment in symptomatic individuals and intervene before clinical disorders develop). Most programs to date have been school based; clinic based approaches are known to exist but are poorly documented (54).

Several recent reviews of the evidence for the effectiveness of ED prevention programs have been published (156,202,235,236) including a systematic review of trials (237). The authors of these reviews conclude that the evidence is still mixed for effectiveness, with many interventions showing weak or no effects, and others documenting effects for as long as two years. Several different approaches show promise in reducing internalization of societal appearance ideals, in improving body satisfaction and in decreasing disordered eating behaviors e.g. (160,169,224); effects often differ by gender and risk status. More methodological rigor is needed (156,202,237). Despite some concerns about early approaches that naively featured recovered ED patients presenting directly to youth (which risked glamorizing the disorder) and provided information about purging methods (which may have inadvertently encouraged such behaviors) (231,238), no evidence for adverse effects has been found in contemporary interventions (235,237).

Most programs to date focus mostly at the individual level, but there is recognition of the need for more holistic, ecological strategies (54,156,169,202,223,232,239) that include multi-disciplinary, multi-level proactive approaches that address the broader environment. This would include, for example, school policies on weight-based harassment; community-based approaches, and strategies that focus on creating empowerment and tolerance (202,203,211,212,233,234,240). Recommendations for future prevention approaches also include greater use of peers and social networks as positive preventive agents (241); greater grounding of interventions in theory (202,242); greater attention to the knowledge gaps and potentially unhealthy attitudes of educators and health professionals (99); addressing (in women) social ties and everyday relationships (243); interactive interventions that increase girls' self esteem and are sensitive to new understandings of female development (230,244); and approaches that emphasize resiliency/protective factors such as self-esteem, sense of control over one's life, family connectedness, positive adult role models and positive involvement in school (85,211,212,233,234). Neumark-Sztainer (156) outlines several issues to be addressed in future programs including: how to move toward ecological interventions; how to address the increasing body image issues in boys; whether the focus should be broad mental health or ED-specific; how to ensure relevancy and sustainability; how to improve evaluation methods; and whether prevention approaches for obesity and disordered eating

should be integrated (156). Research is limited on these more complex approaches; and continued evaluation is needed.

Some examples of innovative programs which have been developed and evaluated by Piran, Levine, Haines, and McVey are:

- The **GoGirls** Program involves girls in media awareness, advocacy, activism and access. These have been shown to reduce internalization of the thin ideal, reduce the drive for thinness, and increase self-acceptance and sense of empowerment (245).
- Piran (1999) used an empowerment oriented, participatory approach at the National Ballet School in Toronto, to reduce body weight and shape preoccupation, and to create a school environment in which students felt comfortable with puberty and growth; this program led to marked reductions in disordered eating and body dissatisfaction (229).
- A school-based approach to reduce weight-related teasing and unhealthy weight control behaviors (**Very Important Kids**) has shown initial promise (246).
- The **Healthy Schools-Healthy Kids** program in Ontario, Canada uses a whole school universal prevention approach with girls and boys in grades six and seven. It includes multiple interventions to impact body satisfaction, internalization of media ideals, size acceptance, disordered eating, weight-based teasing, weight loss and muscle gaining behaviors. A recently published controlled evaluation of this initiative in a large sample documented reductions in internalization of media ideals and weight-loss behaviors for boys and girls, and reductions in disordered eating behaviors for girls. Those at high risk benefited most but when no effects were found for teaching staff (228) an additional online curriculum for teachers was developed (207). The **Healthy Schools-Healthy Kids** program also includes healthy eating and PA messages which makes it a forerunner in the movement toward integrated obesity and disordered eating prevention.

Summary of Background on Eating Disorders and Disordered Eating

In summary, increases in the frequency of some EDs reaching diagnostic thresholds, and the prevalence of subclinical disorders including disordered eating, unhealthy dieting and related behaviors in the general population and in children and youth, and the relatively early stage of evidence for effectiveness of treatment and prevention approaches, indicate that this spectrum of health issues will continue to be of significant concern for the foreseeable future.

Part Two: Body Weight and Health in Societal Context[i]

Introduction

Battle and Brownell noted some 17 years ago that *"it is difficult to envision an environment more effective than ours for producing nearly universal body dissatisfaction, preoccupation with eating and weight, clinical cases of eating disorders, and obesity. The damaging paradox is that while an extremely lean, contoured, and sculpted body is the ideal, and that repeated compelling exposure to this unrealistic ideal is the norm, the environment provides access to and encourages consumption of a diet that is high in fat, high in calories, delicious, widely available and low in cost*" (66, p761). Many other authors have written about our modern environment and its influence on obesity e.g. (20,26,34,36,60) and EDs (241,243); but with few exceptions e.g. (66) these discourses have largely been separate (53-55). It is often considered a paradox that both EDs and obesity would arise in the same environment (53,243); but they likely represent individual responses arising from different biological and psychological vulnerabilities interacting with different micro-environments. An appreciation for the complexity of the sociocultural-environmental context is important to the discussion of future directions for intervention on these difficult health problems. While each of the areas discussed in this Part has its own large body of literature that cannot be comprehensively reviewed, a sampling of what is known about each in relation to body weight and health is presented.

Gender, Ethnicity and SES

Gender is an enormously important variable in relation to body weight and health. The interaction of societal factors, body image and psychological issues that are thought to predispose women to EDs disorder have been described by those from the disciplines of history, philosophy, psychoanalysis and psychiatry (230,247-250). Sociocultural messages about body size and shape and meanings about health and fitness that are often 'mis-attached' to body size can be powerfully devaluting to girls and women (250a). In a recent report by the Canadian Women's Health Network (CWHN) de Groot and Bear (2006) emphasized the importance of recognizing and addressing the much higher prevalence of EDs among girls and women than among boys and men (244). The relationship between sex and ethnic background and social inequities among those who are overweight is complex and requires more research (251). Among those who are overweight, convincing evidence from longitudinal, prospective studies indicates that *both* men and women experience greater adverse socioeconomic consequences than those with chronic medical conditions (47), which is attributed to the stigma associated with overweight (252). However, adolescent girls and women experience the adverse social, occupational and educational consequences to a greater degree than males (47,253). Obese women have been shown to obtain fewer years of education, to earn a lower income, are less likely to marry, and – amongst those who do marry – to experience downward social mobility through marriage, than women who are not obese (11,47,254). Jade (2007) describes the complex dynamics of gender and body weight in noting that when men and women are asked what they fear most, many women- but only a few men – will say gaining weight. When asked what they like least about themselves, women will list physical attributes and men will list non-physical attributes. In reporting on what they find attractive in women, men will most often mention physical appearance, not other personal attributes or resources (204). A Canadian study found that many men with BMIs that place them at increased health risk are content with their weight and are not attempting to reduce it. Whereas, women, particularly those who are young or middle aged, are often trying to lose weight even when their weight is appropriate by health standards (255).

Even so, issues related to body weight and shape are increasing in frequency among boys and men as well; presentations for ED treatment for males are increasing (256,257). A substantial amount of body dissatisfaction is also reported by boys and men, especially if defined with reference to muscularity and underweight as opposed to overweight alone (156,170,172,258,259). Related behaviors such as steroid and food supplement abuse are increasingly being documented (98,156,172). Ricciardelli (2004) reports that several factors associated with disordered eating among boys are similar to those found in girls: BMI, negative affect, self-esteem, perfectionism, drug use, perceived pressure to lose weight from parents and

[i] Some scholars consider body weight related health concerns and in particular the obesity 'epidemic' as socially and politically constructed issues. These debates are too complex to represent adequately in a summary document of this nature, but the interested reader is referred to the readings listed at the end of the reference list.

peers, and participation in sports that focus on leanness (260). Derenne (2006) and others write about what is known in the popular press as the "Adonis complex" and notes that body dissatisfaction in men has been associated with reading men's fitness magazines (98,215,260).

Body weight and health issues also vary according to ethnic status. Kumanyika (2001) notes "*that standards of female attractiveness are intertwined with body size and shape across cultures, perhaps because of the association between fatness and female reproductive status"* (7,p295). Body weight is interpreted differently across cultures, and rituals and beliefs about food and eating vary widely. Lifestyle risk factors for obesity and other chronic diseases have been documented to be higher among children of Haitian, Portuguese, and other Central American/Caribbean family origin than among Canadian-born children in urban neighborhoods (261). The process of acculturation/integration of new immigrants to industrialized countries, including transitioning from traditional diets and PA patterns to the environment and customs of the new country have been shown to place immigrants, and especially the first generation born in the new country, at increased risk of obesity (19). Studies, mainly from Britain, have also shown that second generation immigrants are at increased risk of EDs (262). The consequences of obesity have also been shown to vary with ethnicity. For example, increased health risks are found at lower BMIs for Asians in comparison with Caucasians (19).

Socioeconomic status (SES) is an important consideration in body weight and health. On a global scale, while obesity is increasing worldwide, there is evidence that it is increasing more rapidly in developing countries (38). Within developed and developing countries, the association is complex, and changing. Comprehensive review of the literature (37,263) indicate a consistently inverse association in women from developed countries (higher SES, lower obesity likelihood), that is particularly prominent when SES is based on education or occupation. Findings in men were less consistent. Within developing countries, the association tends to be positive (higher SES, higher obesity likelihood) (37,263), however Monteiro et al. (2004) demonstrated a changing pattern, whereby the burden of obesity in a developing country tends to shift toward the lower SES groups as a country's gross national product increases (264). This pattern likely reflects trends related to globalization and the nutrition transition, such as production and trade of agricultural goods, foreign direct investment in food processing and retailing, and global food advertising and promotion, which have the effect of exacerbating inequalities in diet between rich and poor (265). The physiological impact of stress associated with social inequity may also be important (60). Though the SES patterning of full syndrome EDs is not entirely clear (266,267), several studies indicate that subclinical levels of disordered eating attitudes and behaviors occur with greater frequency among higher SES women in the developed world (181,268-273). An explanation concerns the role of thinness as a marker of social distinction in industrialized society, which makes it more likely to be valued and pursued among those higher on the social spectrum (274,275).

The Social Environment and Relationships

The *immediate* social environment (family, peers, teachers, health professionals) exerts influence in complex ways on body weight status as well as related behaviors and attitudes. In infancy, parents have direct control over the content and delivery of food, and as the child grows parents mediate the child's experiences with food and PA (19,156,276,276a). Negative self-appraisal can be influenced by parental concern about weight status and food restriction behaviors and can begin as early as the preschool period (156,177). In older children and adolescents parents can be a source of general attitudes about weight, specific comments about their own and their children's weight and also models of weight-related behavior (healthy or otherwise) (277). In separate reports from a large population-based study, parental attitudes predicted adolescents' dieting behavior (168,278). Puhl (2007) report that the group mostly likely to endorse weight stereotypes are fathers of high SES, and also, surprisingly, parents who are overweight or obese themselves have no better attitudes toward weight than those with lower body weight. Parents of overweight children also report feelings of guilt, anger, and frustration in not knowing how to assist with successful weight loss which, the authors say, might create a suboptimal atmosphere related to the issue of body weight in the home (12).

In older childhood and adolescence, peers have an influential role. Paxton (1996) describes the body weight-related peer subculture of adolescent girls. In one study 41.5% of girls reported frequent

discussions of weight and shape and dieting ('fat talk'). Adolescence is also a period of intense social comparison of body weight and shape and shared values about the importance of being thin (241,279). Social comparison of body shape for girls is related to body dissatisfaction, as well as dating and boy's attitudes (279). Negative friendship qualities such as friend alienation and friend conflict have been associated with body dissatisfaction and disordered eating in grade 10 girls (280). Larkin (2006) and Needham & Crosnoe (2005) discuss the complex dynamics of self and peer appraisal among adolescents including the phenomenon of perceptions of excess weight or fat even among adolescents of average body weight (203, 281). ED patients often report that pressures from friends to lose weight triggered their initial disordered eating behavior (241). These social network influences have been shown to be related to disordered eating, even after adjusting for BMI, depression and self-esteem (241) though it is not clear whether this is attributable to individuals being influenced by their peers or selecting peers that share their values.

Social networks are also important to the issue of obesity and to efforts to encourage healthy eating and PA in adolescents, although influences seem to be gender-specific (98). Neumark-Sztainer et al. (2002) found that weight-based teasing by peers was reported by 30% of girls and 24% of boys and that the prevalence of teasing increased with BMI (159) and subsequent studies have elaborated on risk and longitudinal patterns (55,173,176). Both body dissatisfaction and development of BED are strongly predicted by weight related-teasing experiences (12). In a study of 441 grade 11 and 12 students in a New England public high school, Wang et al. (2006) found that girls' thoughts about obesity and boys' thoughts about musculature/fitness were associated with peer-perceived popularity as well as their body size and their dieting behavior. Lower levels of popularity were associated with heavier shapes for girls and both thin and heavier shapes for boys. The author concluded that *"peer status is an important source of social reinforcement associated with weight-related behaviors and cognitions"* (282,p658). Thompson et al. (2007; 1999) report studies showing that peers have a greater influence on body dissatisfaction, disordered eating behaviors and self-esteem for high-school girls who are overweight or at risk for overweight than for girls of average weight. Overweight groups also scored higher on a measure of negative comments and attributions from peers (283,284).

Even in adulthood relationships impact women's social and emotional health in relation to body weight. In a qualitative study of 44 women, Paquette and Raine (2004) found that, in addition to the media, relationships with others including spouses and health professionals influenced women's body weight and shape concerns, although the impact was mediated by internal contexts (both self-confident and self-critical) (243). McLaren and Kuh (2004c) found that, among a large sample of middle-aged women, negative body-related comments recalled while growing up and reported negative comments from one's spouse or partner were associated with current body esteem, and that the effect of negative comments while growing up could not be offset by compliments from one's partner (285).

Social influences related to body weight are also expressed more generally *at the macro level* in the form of stigmatizing actions and attitudes. *"Body weight is a very visible and easily understood marker of a person's physical status"* (17,p554). The general stigma associated with overweight, for adults and children/adolescents, has been thoroughly documented (12). Stereotypes associated with overweight/obesity are many and include gluttony/self-indulgence, low moral character, lack of self-discipline or will power, laziness, lack of motivation, sloppy, naughty, mean, weak, dishonest, ugly, dirty and stupid. Overweight individuals are viewed more negatively than individuals with a range of disabilities (12, 32) and morbidly obese people have reported, after gastric bypass surgery, that they would rather be deaf, dyslexic, and have diabetes or serious heart disease than be overweight again (286). These attributes are ascribed ***to*** children as young as preschool age and ***by*** every age, sex, and SES group including health professionals and individuals who are overweight/obese themselves (12,17,32), indicating very potent and nearly universal and collective internalization of these stereotypes in industrialized society. Such stereotypes indicate that obesity is viewed as the result of deliberate behavioral choices, and in this regard we see a commonality with EDs (e.g. AN is frequently described as willful self-starvation) (99).

This stigma around excess weight manifests as discriminatory actions. Puhl and Latner (2007) provide a thorough review of the serious effects of obesity-related stigma and discrimination for emotional and

physical health and in many life domains from interpersonal relationships through employment, education, and health care (12). Overall quality of life is found to be very low among the obese compared to non-obese, including among children. In addition to practical and emotional consequences, a common behavioral consequence of weight-related stigma is avoidance. For example, overweight adults are more likely to cancel medical appointments because they fear lectures about their weight and a generally unfriendly health care environment, and youth avoid social and physical activities (52,99). Although perhaps not so universally negative, stereotypes about EDs are also prevalent, and these are sometimes manifest at the individual level as weight-related teasing. Except in extreme cases of AN and some BED, deviation in body weight is not as visible as in obesity but incidents of harassment about low body weight (whether a disorder is present or not) are reported (203). Parents of patients with EDs report being blamed for their child's illness (157,287) and suffer guilt and shame (155) as do parents of overweight or obese children (12).

Despite the possibility that the increased prevalence of individuals at higher body weights might improve tolerance, there is evidence, indicating that attitudes have actually become more negative over time (14). Latner et al. (2003) demonstrated a 40% more negative appraisal of drawings of obese children by fifth and sixth graders in 2001 than in 1961 (288). Further, in a systematic review of the topic by obesity researchers Jeffrey et al. (2003) concluded that *"there seems to be little reason to think that major shifts in social attitudes favoring larger body sizes have taken place over the last 20 years"* (289, p16S). These researchers note that even though the size of (thin) models has not changed much since the 1960s, since women are on average heavier now – and therefore the overall *discrepancy* is larger (in keeping with Cooley's self-appraisal theory).

A topic that is related to stigma and discrimination is how we define and label phenomena such as obesity. It has been noted that the redefinition of obesity as a disease has some implications. Jutel (2006) describes the change in the use of the term 'overweight' over time and its increasing association with the concept of disease (13). While the upside may be better access to care, the downside may be the reinforcement of automatic but not necessarily accurate beliefs about a heavier body being indicative of compromised health and a slender body being indicative of good health (17). This way of thinking might also extend to perceptions about eating behaviors, wherein individuals who are merely managing their intake in a healthy way might be labeled as 'disordered'.

Information and the Media

Concerning the role of contemporary media, there is no precedent for the modern information boom. The types of available media, accessibility, choice, volume, and exposure time have all risen dramatically in recent years. Derenne (2006) emphasizes the increased power of today's media as well as its conflicting messages and role models (215). Messages about body weight and health come from information sources having varied purposes from general information (e.g. newscasts), entertainment, and promotion (including commercial advertising and information provided by health authorities). Related messages are found in all media types (books, magazines, journal articles, television, movies, radio, the Internet). The lines between these purposes and types are increasingly blurred in modern media; making it harder to discern the source and intent of many messages.

As *direct topics* of media coverage, focus on eating disorders and especially obesity have risen dramatically in recent years (31, 81a). The number of mass media messages about obesity have increased (US & world) from about 2500 per quarter in 1999 to about 12,000 per quarter in 2005 (a 5-fold increase in six years) based on newswire searches by the International Food Information Council and reported by the North American Association for the Study of Obesity (290). Increases in both the frequency of the messages and their intensity are evident, with more recent messages placing more emphasis on health consequences and costs to society; often with an alarmist and derogatory tone (e.g. "Fat Kids Risk Early Death")[ii]. The trends in messages are mirrored in the scientific literature. Burns and Gavey (2004) report that articles listed on the Medline database containing the terms obesity and overweight and the word *'epidemic'* rose from 17 to 184 from 1986-1991 to 1996-2001 (17). Television

[ii] Headline for article by Dr. Gifford-Jones archived on canoe.cahttp://chealth.canoe.ca/

reports of obesity topics are typically accompanied by footage of overweight or obese persons (often with their heads and faces obscured) furthering the connotation of shamefulness. Many news reports are based on information provided to reporters by researchers and both may be culpable in their framing. We have no information on the effects of these messages on youth or on the attitudes of the general public.

Eating disorders are often glamorized in the media; with many celebrities (including young and middle-aged stars) being profiled for having these illnesses (99,215). Despite a slimmer than typical appearance these individuals remain well-dressed, attractive, as well as often being rich and famous. Depictions of the severe wasting of individuals with AN and the extreme conditions of individuals with severe obesity are shown for dramatic and sensationalist effect; with little sensitivity.

The recent broader media focus on health and thinness corresponds with a boom in the dieting and cosmetic surgery industries. The pursuit of body modification seems to have become an international obsession. Examples of this message are abundant, from movies and general TV shows (e.g. UK hit Cook Yourself Thin) to reality TV shows (e.g. The Biggest Loser; The Swan; Last 10 pounds Bootcamp, Fat March), to magazines, and websites that report on the weight gain or loss of celebrities through to a glut of related self-help books such as the New York Times best-selling irreverent weight loss book Skinny Bitch (291). Burns and Gavey (2004) note the inundation of *"images and messages that glorify slenderness and that urge dieting, exercising and body shaping*" (17, p554). They also note the strong connection that is made between being thin and being healthy. As one example of this connection, McLean's January 15, 2007 covered the 'Calorie Restriction' movement which is an approach to eating based on the belief that eating a very low calorie diet will extend the lifespan (292).

The media (including advertising by the style, fitness and dieting industries) is now under scrutiny as a *cause of, or risk factor for* unhealthy body weight related behaviors. There is mounting criticism for its role in promoting body dissatisfaction and for providing the motivation as well as the tools for disordered eating (17,66,85,98,136,204). The level of evidence ranges from anecdotal through experimental – but most points to at least direct culpability for body image problems and drive for thinness, and indirect culpability for disordered eating. For example, in one self-report study, 14-16 year old girls reported that they felt that the strongest pressures to be thin came from the general media and especially fashion industry messages; with fewer citing friends and family as sources of pressure (293). Cross-sectional studies have documented correlations between various kinds of thin-ideal and fat-stigmatizing media content and disordered eating symptoms e.g. (294), which typically vary by gender. Experimentally, mild to moderate body dissatisfaction and drive for thinness have been induced with single exposures to media messages e.g. (184,295-297). Longitudinal evidence also indicates that these effects are *cumulative* (298). Dohnt and Tiggemann (2006) report on a recent prospective study in five to eight year-old girls wherein watching of appearance-focused TV programs was related to increasing dissatisfaction over time. The desire for thinness also preceded low self-esteem. The authors concluded that *"as early as school entry, girls appear to already live in a culture in which peers and the media transmit the thin ideal in a way that negatively influences the development of body image and self-esteem"* (180,p929). In a meta-analysis of 25 experimental studies on the effects of presenting thin media images to women of varying ages, Groesz and Levine (2002) found that body image was seen as significantly more negative upon exposure to thin images compared to viewing images portraying average, plus size or inanimate objects, and effects were stronger in younger and psychologically more vulnerable individuals (Groesz 2002). On the whole current research results "*support the sociocultural perspective that mass media promulgate a slender ideal that elicits body dissatisfaction"* (299, p1). Another multi-study review found an overall small association between media and body image (300) but documented so much heterogeneity among studies that presentation of a combined result was questionable.

Few studies show *direct* links between media exposure and disordered eating behaviors. In a longitudinal study, Field et al. (2001) found that girls and boys who were trying to look like media figures were more likely to have weight concerns and practices (168). Harrison and Hefner (2006) demonstrated that television exposure predicted disordered eating in preadolescent girls in a longitudinal panel study (301). Dramatic evidence of a causal association comes from a natural experiment wherein Becker et al. (2002) showed that among Fijian island adolescent girls exposed to western television for the first time,

unhealthy eating attitudes went from 13% to 29% and the use of vomiting to control weight went from 0 – 11%, in just three years (1995 to 1998) (302).

Associations have also been documented between increased time watching television and personal computer time ("screen time") and obesity (4,65,73). The suggested primary mechanisms are reduced PA and greater junk food consumption after increased exposure to unhealthy food advertising (73). Such exposures in terms of time, number of ads and content of ads have all been well documented (65,303-305).The Kaiser Family foundation report 'Role of Media in Childhood Obesity' provides a comprehensive review of related studies. Research continues to generate evidence showing the power of food advertising on dietary preferences and choices (303) as well as other health behaviors such as teen smoking (306). In a very recently published study of children aged three to five, Dr. Tom Robinson (2007) of Stanford University showed that children prefer the taste of food in McDonald's containers to identical products in control containers (307). Authors of a systematic review conducted for the Food Standards Agency in the U.K. and an expert panel review – "Children, Television Viewing and Weight Status" in the U.S. have concluded that the current evidence shows that media viewing and food marketing do affect children's preferences, purchase behavior and consumption (304,304a). The popular media has also become very interested in the issues of the socio-economics of food and its distribution and trends in food production, marketing and consumption as they relate to health and particularly obesity in videos and books such as 'Fast Food Nation' (308) and 'Supersize Me' (309).

Proponents of the position that the media is not responsible for unhealthy behaviors often argue that the media, at least in terms of general current events reporting, is simply a reflection of societal phenomena. The very recent development of messages and movements countering the prevalent body weight and health discourse lends credence to that argument. A variety of 'body acceptance' messages and movements have surfaced of late. Examples of these are The Body Positive and similar websites which pledge to *"end body hatred and eating problems"*, the plus size modeling movement, and the highly successful commercial advertising campaign promoting body esteem in women by Dove®. The children's book "Full Mouse, Empty Mouse" (310) serves up a lesson to children about the relationships between emotional issues and food intake – both over and under eating. In 2003 actress Jamie Lee Curtis posed for More magazine with unretouched and touched up photos to call attention to the widespread practice of air-brushing and digital enhancement of models' bodies in print ads. A situation comedy/reality television show 'Fat Actress' portrays the plight of an overweight woman trying to find work and fighting the tabloids and then the star goes on to publicize a weight loss 'success'. A social movement described as 'fat acceptance' has evolved more recently into 'fat activism' (311), led by the US National Association for Fat Acceptance (NAAFA) has used specific campaigns to fight size discrimination (312). It is simply not known if these movements/messages are balancing and benign or if they can create complacency about potentially unhealthy body weights. Other types of countering messages are clearly more problematic – such as the rise in 'pro-ana' and 'pro-mia' websites which promote anorexia, bulimia and extreme weight loss activities as a lifestyle choice and provide dangerous tips and advice (112,313). Also problematic are the recent posting of thousands of pro-anorexia 'thinspiration' videos to YouTube, Facebook and MySpace (314).

The media is also the conduit for messages from *authorities* in science or government about body weight and health; generally aimed at prevention and promotion. Typically this information comes in the form of radio or television news reports but increasingly it is provided in the form of websites and public service advertising (e.g. posters, radio and TV ad spots). A classic example is the Canadian Participaction campaign of the 1970s; recently re-launched by the Canadian government under its Healthy Canadians initiative (315). Examples elsewhere include the Verb campaign sponsored by the U.S. Centers for Disease control and aimed at increased PA among youth,(316) and the Go for 2 & 5 healthy eating campaign sponsored by the Australian government (317). The power of the media can be harnessed for positive influence (204) but there are also concerns that public health messages about healthy weights can become very conflated with less healthy messages from other sources on the same topic (17, 77). More sophisticated approaches to message testing (for both effectiveness and unintended effects) are beginning to be used e.g. (318).

Physical Activity

Low PA levels are clearly linked with risk for overweight and obesity (11) and PA (along with good nutrition) is a safe and effective solution to unhealthy elevated body weights (26). The sociocultural-environmental influences on PA levels are also complex. The reduced levels of PA in modern society are well documented (20,34), and on average fall below the levels needed for the average person to maintain energy balance (7). A more sedentary lifestyle is blamed on home computer/internet use and television viewing and reduced opportunities for regular exercise because of perceived unsafe outdoor environments, and the decline in high quality physical education programs in schools (26,65,319).

Variables that facilitate PA in individual microenvironments have been well studied. A random survey of 54,466 Canadian adults reported that higher educational level and the proportion of friends who exercise are positively associated with PA levels (320). Among Canadian youth, gender and age are major correlates of PA, with girls being less active than boys and declines in PA occurring around the age of 12. Other positive predictors of PA are perceptions of athletic ability, self-efficacy, interest in organized group activities, use of recreation time for PA, friends' and family's frequency of participation, active commuting to school, family's financial situation, concern about gaining weight, and high academic achievement (321,322). Reduced enrolment in physical education classes and in PA in general is attributed to body image concerns (19,52,54). O'Dea (2004a) describes factors that discourage PA for overweight adolescents which include body consciousness, lack of private changing rooms and physically revealing sports uniforms. She also notes that coercion can increase reluctance to participate (160,259). Puhl and Latner (2007) also suggest that incidents of weight-related harassment that have occurred during physical activities can induce negative attitudes toward sports and further avoidance of PA (12). Students aged 7 to 17 years report their perceived barriers to PA to be a preference for indoor activities, lack of motivation and energy, time constraints and social factors such as peer or parental modeling (323). McLaren and Kuh (2004) showed that poor body esteem among middle-aged women led to avoidance of physical activity (285).

Macro environmental factors at the neighborhood or community level, are also implicated in reduced PA levels and obesity risk. A new research literature is emerging on these and other relationships between the 'built environment' and opportunities for PA and/or risk for obesity. It examines environmental characteristics such as the availability of recreational space or facilities, neighborhood 'walkability', street type, density, land use, topography, roadways and perceived safety (32,324). Most studies to date have found positive associations with obesity (324). Increasingly, multi-level research will enhance our understanding of the way that micro and macro-enviromental factors interact to predict PA e.g. (325).

Food and Nutrition

Food and nutrition play an important role in body weight and health issues (34). Dietary behavior including lower fruit and vegetable consumption; higher consumption of soft drinks, sweets, snack foods, take-away foods and large portions; skipping breakfast or having a low quality breakfast and purchasing lunch at school have all been clearly linked with overweight and obesity in children and adults even after adjustment for age and SES (11,65,96,319,326). Some see a paradox in the increase in obesity despite declining fat intake among adults (327) but the overall increases in energy/calorie intake probably account for this apparent paradox The dietary intake of children and adolescents had not been widely studied and there is clear evidence of children under-reporting their food intake (328). It has been very difficult to measure diet precisely, but clearly the balance between energy intake and energy expenditure has shifted with time.

Changes in the diet of the average person in developed countries have been rapid in the past couple of decades and these changes are also driven, in large part, by sociocultural forces. Dietary changes have occurred in all of composition, quantity and quality, energy density and cost (20,26,33,34,36,326,329). Diets of adolescents; in a Canadian study indicated good nutrient intakes but also high intakes of nutrient-poor foods including high sugar beverages, cakes/cookies/pastries, sugars/jams/syrups, and salty snacks (330).

At the micro environmental level, *"parental control over the children's food supply is an important factor in determining what a child eats and whether or not he/she will become overweight"* (96, p804). The family context has changed due to parents' work demands, resulting in less time for food preparation, more pre-prepared, taken-out and eaten-out meals (which are documented to be of lower nutritional quality), and fewer sit-down mealtimes at home (32,33,77). There are reports that holiday celebrations in our culture have become opportunities for excessive consumption of frequently less nutritious fare (32). The enormous variety of available foods is also blamed for reduced satiety (77,326). Menu options for children in restaurants have been shown to be of lower nutritional quality than those for adults (331). Commercial food displays are increasingly designed to encourage impulsive and large portion shopping (77). Barriers to healthy food choices as perceived by youth (aged 7 -17) were identified in a qualitative study as convenience, taste and social factors such as parental control over food choices and peer pressure (323). Several studies have shown that some parents may not recognize their children's risk status, (332); this lack of awareness may be a significant barrier to improving the nutritional quality of food offerings.

In the macro environment, the increased availability of sodas and snack foods in schools, the growth in fast-food outlets and convenience stores, the trend to super sizing portions in fast food establishments and restaurants, and the increasing availability of processed high-calorie and high-fat grocery items in the marketplace are the most highly cited sociocultural changes related to food and nutrition (26,332a). Shaw et al. (2007) also describe the influences of the industrialization of food production, food preservation technology and the development of supermarkets (32). They also note that unhealthy *"foods are often cheaper and more readily available than healthier alternatives. Similarly, high fat 'junk' foods are supplied in a wider variety of settings"* (32, p2). Popkin (2002) examines the stages of transition in nutrition by country from earlier patterns of undernutrition and famine to the current patterns of over-nutrition and nutrition-related non-communicable diseases including obesity (38). Dubois (2006) and others also discuss the high level, global issues of food production and distribution in context of cultural, socioeconomic and political factors e.g. (33,34,66,265,333). Recommendations about the optimal composition of the diet at the individual level have been refined but there is a growing tendency to publicize "new" healthy ways to eat prior to adequate evidence of any true health benefit e.g. (334). The relationship between food intake and good health is becoming politicized with those who are documenting the unhealthy trends in our food culture and our relationship with food pitted against the food industry and an increasingly vocal industry lobby (20,74). In this context *"careful regulation of energy intake and output is reified as a healthy practice*" (17, p549) and more esoteric diets and eating plans continue to surface (292) and exemplify our increasingly unnatural relationship with food.

Part Three: Seeking Common Ground to Promote Health

The Risks of Working at Cross-Purposes

After examining the complexity of the modern sociocultural context for body weight and health, it is not difficult to see how current prevention programs for obesity and EDs might be delivering conflicting messages. For example, the monitoring of weight (i.e. to monitor loss or to prevent gain) can have the unintended consequence of promoting obsession with weight and shape (52,335). Conversely, messages about body weight acceptance promoted by EDs prevention specialists and by some in industry (200) might create complacency about potentially unhealthy body weights. Neumark Stzainer (2003) notes that *"Adolescents may be confused if, for example, they participate in an obesity prevention program in which their body composition is assessed and they are told to restrict their fat intake, to decrease portion sizes, and to increase their PA and then they participate in an ED prevention program in which they are told that body weight is genetically predetermined and cannot be modified, that all body sizes are acceptable, and that one should avoid food restrictions"* (54, p165).

These competing messages may at best neutralize each other – at worse they could generate unintended effects. *General concerns about the sociocultural context for prevention programs*, such as the following, have been raised.

- That private sector food, fitness, and dieting enterprises will use public health concerns about obesity to their commercial advantage through tactics to elevate individual's concerns about weight gain (17, 136)
- That, in the context of these wider societal messages and despite the provision of sound information, individuals will react to public health or prevention messages about by adopting *unhealthy* weight control strategies such as strict regulation of intake and expenditure and smoking (12,17,19,52,54,55,70,77,136,160,259,336), and that these behaviors may increase the prevalence of eating disorders and/or overweight and obesity (185,186,189,246)

In addition some arguments and counterarguments about the potential unintended effects of obesity and/or ED prevention programs have been made. They include:

- That an emphasis on external measures of health (e.g. BMI) and narrow definitions of healthy weights will distract from 'internal health and wellbeing' (17,136) and broad sociocultural solutions and has serious consequences for mental health (70) while others recognize that nutrition and PA also benefit mental health
- A quick internet search easily identified a health promotion website "Girl Power" aimed at adolescent girls that discouraged girls from taking up disordered eating behaviors but provided detailed information about binging and purging methods (340). It could, however, be argued that this information is readily available anyway.
- That eating may become increasingly emotionally problematic (55,79,136,160,259); in a context where information about the differential nutritional value of foods may be oversimplified as 'good' or 'bad' foods
- That obese children and their parents may misinterpret information from public health authorities about childhood overweight and obesity as cues for seeking fad or restrictive diets, which are unsuitable for growing children (52) and may jeopardize normal health and growth (14,79) or mental health (14,335). After studying weight related self-esteem among five-year-old girls and their parent's concerns Davison et al. write *"Public health programs that raise parental awareness of childhood overweight without also providing constructive and blame-free alternatives for addressing child weight problems may be detrimental to children's mental health"* (177)
- O'Dea (2002) tested one public service ad and one industry ad aimed at improving body acceptance in 328 12-19 year old girls. The print ads we rated as not-beneficial by 28% of participants, 35% did not like them and 69% did not want their own copy. The ads apparently made them feel worse about themselves. Eight percent of girls did not know what message meant to portray and 8% received an incorrect or harmful message (52, 341)

- That overweight and obese youth will be further stigmatized resulting in psychosocial (shame, guilt, hopelessness) and behavioral consequences (e.g. avoidance of PA and healthcare) (12,52,70,99,337,338). In 1999, Cameron et al. published a study documenting reduced self-esteem in 54 obese children aged 10-15 involved in a weight management programs compared to 60 not enrolled; with no differences in weight loss over the 12 week program (338)
- Some early ED prevention programs, that involved testimonies by former ED patients or provided information about signs and symptoms, were reported to have possibly increased disordered eating (238), although recent reviews have found no evidence for such effects in newer programs
- O'Dea and Abraham found that 87% of teachers reported recommended strict calorie-controlled diets to their overweight students (99).
- In an on-line, school-based ED prevention program, Abascal (2003) identified the potential for negative comments of some participants to create an adverse environment for the higher-risk participants, and recommended further study (225).
- Energy restriction in obese children who were on well-controlled and supervised weight reduction diets have been shown to adversely affect height growth velocity (342)
- A BMI screening program that included 'report cards' to parents documented that parents' responses often included potentially unhealthy attempts to manage or reduce their childrens' weights (14)
- Lee and colleagues (2005) found that 11% of individuals with diagnosed EDs indicated that condition was precipitated by mandatory participation in a school based 'health and fitness' program that targeted overweight students (124)

One could reasonably argue that these incidents are few among the many positive body weight and health promotion programs now implemented and very recent findings suggest that thoughtful programs aimed at obesity prevention can actually *reduce* unhealthy weight-control behaviors (107, 108) and thoughtful programs aimed at ED prevention can improve healthy eating and physical activity. However, the degree of concern currently warranted is simply not known, since many programs do not assess psychosocial outcomes or unintended outcomes (19), and many of the issues raised are based on anecdote. While inaction on such serious issues is not an option, evidence from other health risk behavior contexts indicates that caution is warranted. For example, Fishbein et al. (2002) found that one third of public service advertisements designed to prevent illicit drug use were rated by adolescents as increasing their likelihood of trying or using drugs (339).

Similarities and Differences between the Fields

In reviewing literature from both fields, our Symposium team was struck by how similar many of the issues are across the obesity/overweight and ED/disordered eating fields, as well as some notable differences. The preparation of this Discussion Document provided us with a unique opportunity to draw out these similarities and differences across the fields for consideration and further discussion at the meeting.

SIMILARITIES

Related to the nature of obesity and EDs:

- Neither condition of concern (overweight/slenderness) has an absolute or perfect relationship with physical health except at the extremes, and then health is significantly compromised.
- For both conditions, those at moderate levels of risk constitute the pool from which those at higher risk emerge, and this subthreshold pool is large
- Diagnosis/measurement of the conditions of interest (BMI/body fat, ED symptoms) is imperfect; definitions are under challenge and criteria may not be equally applicable in different contexts and cultures
- Both have received increased attention from the media and society in general in recent years
- Identification/presentation is being seen in younger ages
- Both are associated with poor mental health (self-esteem, mood), problems with functioning in several domains including psychosocial and poor quality of life
- Both are subject to stigma and discrimination

- Both have complex multi-causal (bio/psycho/social/environmental) etiology and similar causal pathways with societal and environmental (micro and macro) influences acting on genetic and behavioral susceptibilities
- Strong beliefs about the degree of personal responsibility and control exist for both conditions (e.g. willful self starvation or purging, choosing to overeat)
- At the environmental level, both have substantial and shifting sociocultural influences.
- Research on both conditions has been concentrated on biomedical/intra-individual approaches

Primarily related to prevention

- In both, although prognosis (i.e., the relationship between risk status and later health consequences is imperfect, this is not often acknowledged)
- Both have had significant challenges with attempts at policy level initiatives – e.g. action against food marketing and BMI limits for models
- Both fields have targeted interventions at females to a greater degree, especially the ED field.
- Prevention programs have largely been implemented in school settings, with fewer initiatives in other contexts that are probably important – homes, workplaces, communities, and the internet, although both fields are evolving in these directions
- Debates continue for both about whether prevention should be targeted (secondary) or universal (primary) with more recent approaches having aspects of both
- Initial strategies in both tended to focus on individuals and groups, and now are moving toward broader change in social and cultural environments and multi-sector approaches
- Research on both conditions has been concentrated on biomedical/intra-individual approaches
- It is hard to mount prevention interventions of sufficient potency and duration to counter the enormous strength and ubiquity of sociocultural pressures in both
- In both fields, immediate outcome is often easier to demonstrate in initiatives that target at risk individuals, but those approaches also may carry more risk for unintended effects, and may have low impact at the population level
- While some experts/authorities from both sides have long recognized a need to focus on promotion of healthy eating, active living and positive self-esteem rather than the achievement of 'ideal' body weight, the focus on body shape and size remains very common
- In both conditions, prevention is preferred over cure. That is, preventing the conditions in the first place (primary prevention) and the psychological and physical co-morbidity associated with both conditions (secondary prevention) is preferred to addressing the frequently relapsing course of each
- Examples of poorly conceived preventive approaches and unintended effects, despite good intentions, can be found in both fields
- For both, ultimate health outcomes are relatively far removed temporally from the intervention, necessitating a focus on more immediate or proximal indicators of outcome
- In prevention, similar factors limit effectiveness (e.g. behavior is hard to change if the existing behavior is more rewarding than the alternative; or the source and/or authority of the message is questionable, and if non-compliance can be disguised) and similar general health promotion strategies seem to work (e.g. multiple reinforcing and multiple-level interventions that are sustained and involve recipients in design
- Educational approaches are still implemented with greater frequency than environmental, policy or regulatory approaches, despite the frequent lower effectiveness or ineffectiveness of educational approaches alone
- Progressive prevention approaches in both fields are becoming more similar

Primarily related to treatment

- Self-diagnosis and self treatment is common and can be the source of major problems in both
- Both fields are involved in the treatment of binge eating disorder (BED)
- In both, eating behaviors can become separated from natural bodily cues and have other drivers (emotional eating, cognitive eating, recreational eating)

- Individuals with both conditions tend to avoid healthcare providers and the system in the earlier stages, resulting in very high later stage costs once in treatment
- In treatment for both, a chronic course, including frequent relapse, is the typical trajectory
- The costs and availability of current treatment is limited relative to need, making direct treatment infeasible for most
- Medications have largely had limited effectiveness so far and may also have concerning side effects
- Cognitive behavioral approaches have had fairly good initial success – and both conditions seem to respond to psychosocial approaches in general and CBT approaches in particular (for EDs this is true for BN, only minimally for AN)
- Approaches that focus on readiness/motivation to change approaches have shown promise in treatment in both fields
- Despite the evidence that quality of life is significantly affected, treatment approaches tend not to use it as a measure of outcome
- Some of the same professionals (e.g. family physicians, dietitians, psychologists) are involved in treatment for both
- Treatment challenges stem from the intractable and conditioned nature of the behaviors in both conditions and the difficulty in reversing physiological sequelae

Related to both treatment and prevention

- At the individual level, lifestyle and behavior are important predisposing and perpetuating factors in both
- Treatment and prevention approaches are in the early stages of development with mixed effectiveness to date but rapid progress toward more sophisticated approaches
- For both, the health professionals and educators involved can have their own unhealthy beliefs and attitudes, which can impede intervention success
- For both, social supports and networks (parents, peers, spouses) can either contribute to or detract from improving health or risk status
- Experts from both sides have promoted the need for discussion across the two fields and for the need for diverse perspectives and disciplines
- Experts in both fields have identified a need for standardizing definitions and measures for research and practice
- There is controversy in both fields about how medicalized the approach to the risk condition should be

DIFFERENCES

- The same behaviors that are considered pathological in eating disorders (e.g. calorie restriction, high levels of exercise) are prescribed for obesity; this is described as the “fundamental paradox” by Irving & Neumark-Sztainer (53)
- If using the strict, current diagnostic criteria for each; the population prevalence of obesity is much higher than the population prevalence of EDs
- The general public views them as opposites.
- How the disorders in their extremes manifest in the individual and the approaches to and goals of treatment are vastly different.
- Perspectives and orientation to several integral concepts are quite different. These concepts include ‘dieting’; whether foods should be classed as ‘good’ foods and ‘bad’ foods’; the role of dietary restraint vs. eating according to body cues; the wisdom of calorie counting; whether body dissatisfaction is a motivator for change or a risk factor for further poor health; the promotion of body acceptance, the notion of ‘portion control’; the idea of ‘healthy weights’; the concept of ‘healthy PA vs. excessive exercise’; the notion that the body can be shaped/changed at will; and whether an ‘ideal body weight’ is achievable by everyone in a population; what a ‘healthy weight practice’ is; the degree of self-monitoring that is appropriate (e.g. daily weighing); how much conscious attention an individual should be put on eating and weight issues.

- The idea that listening to body cues and trusting natural appetite (e.g. health at any size movement) won't work in the current environment and because of biologically based desires for calorie dense foods
- The OB field has traditionally had more medical/behavioral professionals and the ED field has had more psychologically trained professionals.
- There are controversies about screening in obesity which haven't really surfaced in EDs.
- Whether weight loss, in and of itself, can improve self-esteem, social functioning and wellness or whether all improvement on those variables is attributed to positive lifestyle changes
- In OB gender issues are not addressed as an important content issue for prevention programs – although stigma and social outcomes have been examined according to gender
- In OB few interventions have addressed psychosocial issues and in ED few interventions have addressed nutrition and active living.
- Obesity has hit the radar of policy-makers in a major way in many countries, and globally (i.e. the WHO), and there are many policy documents, and recommendations and funding for action. This is not true for EDs.
- Opportunities for interaction between researchers and practitioners across the fields are few – e.g. conferences and professional societies are mostly separate.
- Research funding, from both government and industry, is currently more readily available to the OB field.
- Some general controversy remains about whether dieting leads to ED symptoms including binge eating; expert reviews indicate that *supervised* changes in eating behavior and PA do not increase risk for EDs
- While both show an association with SES, the direction of the association shows differences in the developed world, obesity has been associated with lower SES while disordered eating has been associated with higher social classes, although for both this appears to be changing

The Rationale for Complementary or Integrated Approaches

Despite some common risk factors and socio-environmental contexts, there has been little communication between the fields of obesity and disordered eating in either research or practice (54,55). Concerns about working at cross-purposes and potential unintended effects are one good reason to increase communication across obesity and EDs fields generally, spanning treatment and prevention aspects as well. A few experts from each field have begun to make arguments for not just more dialog, but for more complementary and even integrated approaches (53-55,107,108,159,175,343). To date these arguments focus primarily on integrated approaches to primary prevention[iii]. Highlights from this small body of literature are provided next.

In 1996, Katherine Battle and Kelly Brownell published a paper that, for the first time, addressed the issue of intervention on EDs and obesity in the same article (66). They noted some similarities between the fields, raised concerns about the inadequacy of approaches of the time, emphasized the challenges of counteracting strong social and economic forces in both, and raised the notion of unintended effects in preventive efforts. Since that time other authors have expanded the discussion and raised the possibility of integrated approaches.

Neumark Sztainer and others (53-55,66,156,175,343) have built a cogent rationale for integration based on both conceptual and practical grounds. Regarding conceptual issues, they argue that there is substantial overlap across EDs and obesity and also that some disorders will cross-over to others. A theoretical case has been made for several shared risk factors, that is increasingly supported by empirical work (53,55,156,173,175). Practical grounds include the fact that prevention settings such as schools

[iii] Discussions about integrated treatment of all body weight related disorders has not yet surfaced in the research literature but a handful of clinics which offer treatment for the full range can be found in an internet search. A major textbook covering both disorders "Eating Disorders and Obesity" was published in 1995 and in second edition in 2002 by C. Fairburn and K. Brownell (New York; Guilford Press). The increasing recognition and presentation of binge eating disorder to both clinical specialties may also stimulate connections across treatment settings.

have limits on the amount of time for involvement in programs, that resources may be wasted on multiple, separate programs, and that integration would reduce the risks of conflicting and unintended effects. Challenges to integration include differences in the disorders (at least at their most extreme) and their treatment approaches, differences in philosophical perspectives and language and the difficulties in developing suitable messages that address the complexities of the issues while being simple enough to be effective (53-55,156,175).

Recommendations for moving forward on complementary or integrated approaches include suggestions related to the content of interventions, as well as processes for advancing the agenda. Content recommendations are:

- Attending to the spectrum of body weight and health conditions, (including milder conditions), rather than just a single diagnostic category, in context of the 'whole child/person' not just the condition of the concern (53,55,156,232)
- Determine appropriate target audiences (54)
- Keep the emphasis on normalizing eating patterns, attending to body cues, and enjoying PA (54,55,156)
- Ensure healthy alternatives (to disordered eating) as these are preferred by participants (55)
- Carefully develop and test messages prior to widespread delivery (52,54,55,341)
- Include multiple components - healthy weight management, healthy eating patterns, increased PA, enhanced media literacy, positive body image, and coping skills for negative affect and stressors (156)
- Use multi-level ecological approaches and be prepared to challenge vested social and economic interests (53,55,183)
- Promote healthy lifestyles based on factors that build resiliency in youth (183)
- Base programs on common risk factors for both conditions (dieting, media use, body image dissatisfaction and weight-related teasing) (53,55,156)

Process suggestions are:

- Sound and rigorous evaluation processes, including assessment of unintended consequences (156,159)
- Advance awareness and communication across disciplines (53-55,156,183)
- Initiate collaborative research across disciplines (53, 54,183)
- Continue research into common risk factors (54)
- Design programs with input from multiple disciplines (54,156,183)

A few new progressive prevention studies demonstrate that more integrated programming is possible. The **New Moves** program is a program arising from the obesity prevention field which includes disordered eating prevention components was described in the obesity prevention section of this document (55, 106). The **5-2-1 Go! Intervention** obesity prevention program shows promise *in reducing unhealthy weight control behaviors* (107,108). Similarly, the **Healthy Schools Healthy Kids** program, aimed primarily at disordered eating behavior, has also incorporated healthy eating and PA (228). These innovative approaches indicate that some prevention programs are becoming increasingly similar.

Neumark-Sztainer (2005) raises four key questions for the fields to consider regarding integration (55):

Is there a need for integration?
Can we bridge the fields?
Can we foster the development of environments that promote healthy eating and physical activity and promote the acceptance of diverse body shapes and sizes?
Can educational approaches address a range of weight-related disorders? Can we work toward integrated interventions and what would we do?

Possible Questions for Consideration and/or Discussion

1. How realistic is the message 'listen to your body, trust your natural appetites' in the current environment and the natural desire for calorie dense foods? Are obesity and EDs actually expected/'natural' human responses to our current sociocultural environment?

2. In discussion of EDs and obesity, we sometimes hear these issues described as 'the spectrum of weight related issues'. Do EDs and obesity exist on opposite ends of a continuum? Do they even belong on the same continuum? What are the implications of these different viewpoints?

3. One aspect of the difficulty with integrating the fields concerns terminology and definitions. What is disordered eating? What is dieting? Does it matter that these are inconsistently defined? Does it matter that the fields use similar words in different ways? Would it help to work towards consensus, or at least towards clarity?

4. There is increasing recognition within the health disciplines that 'sociocultural influences' play an important role in both obesity and EDs. What are 'sociocultural influences' exactly? How can we study them? Would it help to work towards a more refined understanding of these influences? How would this improve our efforts at prevention? Treatment?

5. In the developed world, obesity tends to be inversely related to SES, whereas attributes such as body dissatisfaction, disordered eating etc. have at least historically been found to be more prominent among those of high SES. In both cases, this is especially prominent for women. Why is this? What are the implications for research? For prevention? For integrated prevention?

6. Both obesity and EDs are incredibly complex problems, with social, political, cultural, economic, and psychological etc influences. How do we reconcile this complexity with the need to develop interventions that are both feasible and effective?

7. Should the efforts at integration be primarily aimed at prevention? In other words, is integration of treatment approaches realistic or even desirable? After recognizing the uniqueness of individual patients, is there a place for co-locating services/professionals and developing clinical practice guidelines that move toward a more holistic approach that includes multi-disciplinary teams providing medical, behavioral, psychosocial and (micro) environmental interventions? While our group isn't necessarily the right one to advance such an agenda, the question may be an interesting one for this multi-disciplinary and multi-perspective discussion.

8. What are the remaining barriers to and challenges for integration of prevention approaches? For example does integrating healthy eating and lifestyle education with lessons on body images send contradictory messages; are these messages any less contradictory if they are sent separately to the same audience? Can programs still be effective if the focus on weight and weight control is reduced or eliminated?

9. Is it possible or desirable to integrate the fields or just cooperate? If there is agreement on an initial approach or model, how would one operationalize that in the short term?

10. What are important next steps for research (i.e. processes). What are priority topics for a research agenda (i.e. content) over the next 5 years?

11. What important messages can be taken from the symposium, if any, for *immediate* policy action?

Conclusion

Astrup (2007) summarizes the current level of concern about trends in overweight and obesity *"we have few, if any, long-term strategies for how we are going to get out of the obesity epidemic or even stop its progression"*(29, p126). Our Symposium team agrees with Dr. Neumark-Sztainer who wrote *"Prevention interventions that address the broad spectrum of weight-related disorders, enhance skill development for behavioral change, and provide support for dealing with potentially harmful social norms are warranted in light of the high prevalence and co-occurrence of obesity and unhealthy weight-related behaviors"* (159, p171). There is an unprecedented sense of urgency to effectively address these serious health issues, not only in their extreme forms but also in their subthreshold expressions in the general population and especially among children and youth. It will be increasingly important that researchers, policy-makers and practitioners expand their understanding of the complex issues in body weight and health and embrace dialog and collaboration across disciplines and fields in order to effectively intervene, with the ultimate aim of healthier future generations.

References

1. Kirby M. Out of the Shadows at Last. Transforming Mental Health, Mental Illness and Addiction Services in Canada; 2006.
2. Texas Dept. of State Health Services. Obesity and Overweight. 2007 [cited August 27]; Available from: http://www.dshs.state.tx.us/phn/define.shtrm/
3. Flegal K, Tabak C, Ogden C. Overweight in children: definitions and interpretation. Health Educ Res. 2006;21(6):755-60.
4. Willows N. Overweight in First Nations children: prevalence, implications, and solutions. J Aborig Health. 2005 March:76-86.
4a. Snijder MB, van Dam RM, Visser M, Seidell JC. What aspects of body fat are particularly hazardous and how do we measure them? Int J Epidemiol 2006;35:83-92.
5. Stearns P. Bodies and Beauty in the Modern West. New York: New York University Press; 1997.
6. Schwartz H. Never Satisfied: A Cultural History of Diets, Fantasies, and Fat. New York: The Free Press; 1986.
7. Kumanyika S. Minisymposium on obesity: overview and some strategic considerations. Annu Rev Public Health. 2001;22:293-308.
8. Lau D, Douketis J, Morrison K, Hramiak I, Sharma A, Ur E. 2006 Canadian clinical practice guidelines on the management and prevention of obesity in adults and children. CMAJ. 2007 April 10;176(8):118.
9. WHO. Obesity and other diet-related chronic diseases. 2007 [cited September 14]; Available from: http://www.who.int/nutrition/topics/en/
10. Shaw K, Gennat H, O'Rourke P, DelMar C. Exercise for overweight or obesity: The Cochrane Collaboration; 2007a.
11. Tjepkema M. Measured obesity. Adult obesity in Canada: measured height and weight. Ottawa: Statistics Canada; 2005.
12. Puhl R, Latner J. Stigma, obesity, and the health of the Nation's children. Psychol Bull. 2007;133(4):557-80.
13. Jutel A. The emergence of overweight as a disease entity: measuring up normality. Soc Sci Med. 2006;63:2268-76.
14. Ikeda J, Crawford P, Woodward-Lopez G. BMI screening in schools: helpful or harmful. Health Educ Res. 2006;21(6):761-9.
15. Willms J. Early childhood obesity: a call for early surveillance and preventive measures. CMAJ. 2004;171(3):243-4.
16. Fairburn C, Brownell K. Eating Disorders and Obesity. 2nd ed. New York: The Guilford Press; 2002.
17. Burns M, Gavey N. Healthy weight at what cost? Bulimia and a discourse of weight control. J Health Psychol. 2004;9(4):549-65.
18. Kumanyika S. The obesity epidemic: looking in the mirror. AM J Epidemiol. 2007;166(3):243-5.
19. Flynn M, McNeil D, Maloff B, Mutasingwa D, Wu M, Ford C, et al. Reducing obesity and related chronic disease risk in children and youth: a synthesis of evidence with 'best practice' recommendations. Obes Rev. 2006;7(Suppl1):7-66.
20. Kim S, Popkin B. Commentary: understanding the epidemiology of overweight and obesity - a real global public health concern. Int J Epidemiol. 2006;35:60-7.
21. Tjepkema M, Shields M. Nutrition: Findings from the Canadian Community Health Survey – Overweight Canadian children and adolescents. Ottawa: Statistics Canada, 2005.
22. Luo W, Morrison H, deGroh M, Waters C, DesMeules M, Jones-McLean E, et al. The burden of adult obesity in Canada. Chron Dis Can. 2007;27(4):135-44.
23. Tremblay M, Katzmarzyk P, Willms J. Temporal trends in overweight and obesity in Canada, 1981-1996. Int J Obesity. 2002;26:538-43.
24. Tremblay M, Willms J. Secular trends in the body mass index of Canadian children. CMAJ. 2000 November 28;163(11):1429-33.
25. Colquitt J, Clegg A, Loveman E, Royle P, Sidhu M. Surgery for morbid obesity: The Cochrane Collaboration; 2007.
26. Frank J, DiRuggiero E. Prevention: delivering the goods. Longwoods Rev. 2003;1(2).
27. WHO. Obesity and overweight. [cited August 15]; Available from: http://www.who.int/mediacentre/factsheets/fs311/en/index.html
28. Bray G. Risks of obesity. Endocrinol Metab Clin N Am. 2003;32:787-804.
29. Astrup A, Hill J, Rossner S. The cause of obesity: are we barking up the wrong tree? Obes Rev. 2004;4:125-7.
29b. Volkow N. Issue for DSM-V. Should obesity be included as a brain disorder? Am J Psychiatry 2007; 164: 708-10.
30. Mantzoros C. The role of leptin and hypothalamic neuropeptides in energy homeostasis: update on leptin in obesity. Growth Horm IGF Res. 2001;11(SupplA):S85-S9.
31. Swinburn B, Gill T, Kumanyika S. Obesity prevention: a proposed framework for translating evidence into action. Obes Rev. 2005;6:23-33.
32. Shaw K, O'Rourke P, DelMar C, Kenardy J. Psychological interventions for overweight or obesity: The Cochrane Collaboration; 2007b.
33. Dubois L. Food, nutrition, and population health: from scarcity to social inequalities. In: Heymann J, Hertzman C, Barer M, Evans R, editors. Healthier Societies: from Analysis to Action. New York: Oxford University Press; 2006.
34. Caballero B. The global epidemic of obesity: an overview. Epidemiol Rev. 2007;29:1-5.
35. Kluger J. The Science of appetite. Time. 2007 June 11:32-9.
36. Summerbell C, Waters E, Edmunds L, Kelly S, Brown T, Campbell K. Interventions for preventing obesity in children: The Cochrane Collaboration; 2007a.
37. McLaren L. Socioeconomic status and obesity. Epidemiologic Reviews. 2007a;29:29-48.
38. Popkin B. Part II. What is unique about the experience in lower and middle income less-industrialized countries compared with the very high income industrialized countries? The shift in stages of the nutritional transition in the developing world differs from past experiences. Public Health Nutr. 2002;5(1A):205-14.
38a. Prentice AM. The emerging epidemic of obesity in developing countries. Int J Epidemiol 2006;35:93-99.
39. Barlow S, Dietz W. Obesity evaluation and treatment: expert committee recommendations. Pediatrics. 1998 September;102(3).
40. Hall W, Watkins L, Wright J, Wenger N, Kumanyika S, GavinIII J, et al. The metabolic syndrome: recognition and management. Dis Manag. 2006;9(1).
41. Stein J. Fact sheet: major causes of death in Canada, 1993-1995. Chron Dis Can. 1997;18:91-2.
42. Katzmarzyk P, Arden C. Overweight and obesity mortality trends in Canada, 1985-2000. Can J Public Health. 2004a;95:16-20.
42a. Caballero B, Wang Y. Commentary: Obesity and mortality - light at the end but still a long tunnel. Int J Epidemiol 2006; 35:21-22.

43. McLaren L, Beck C, Patten S, Adair CE. The relationship between body mass index and mental health: a population-based study of the effects of the definition of mental health (in press Social Psychiatry and Psychiatric Epidemiology)
44. McIntyre R, Konarski J, Wilkins K, Soczynska J, Kennedy S. Obesity in bipolar disorder and major depressive disorder: results from a national community health survey on mental health and well-being. Can J Psychiatry. 2006;51(5):274-80.
44a. Baker JL, Olsen LW, Sorensen TIA. Childhood body-mass index and the risk of coronary heart disease in adulthood. N Engl J Med 2007;357:2329-37.
45. Strauss R, Pollack H. Social marginalization of overweight children. Arch Pediatr Adolesc Med. 2003;157:746-52.
46. Schwimmer J, Burwinkle T, Varni J. Health-related quality of life of severely obese children and adolescents. JAMA. 2003;289(14):1813-9.
47. Gortmaker S, Must A, Perrin J, Sobol A, Dietz W. Social and economic consequences of overweight among adolescence and young adulthood. N Engl J Med. 1993;329:1008-12.
48. Averett S, Korenman S. The economic reality of The Beauty Myth. J Hum Resour. 1996;31:304-30.
49. Birmingham C, Muller J, Palepu A, Spinelli J, Anis A. The cost of obesity in Canada. CMAJ. 1999 February 23;160(4):483-8.
49a. American Academy of Pediatrics. Television and the Family. [cited October 15]; Available from http://www.aap.org/family/tv1.htm
50. Katzmarzyk P, Janseen I. The economic costs associated with physical inactivity and obesity in Canada: an update. Can J Appl Physiol. 2004b;29:90-115.
51. Carey V, Walters E, Colditz G, Soloman C, Willett W, Rosner B, et al. Body fat distribution and risk of non-insulin-dependent diabetes mellitus in women. The Nurses' Health Study. AM J Epidemiol. 1997;145(7):614-9.
52. O'Dea J. Prevention of childhood obesity. Health Educ Res. 2005a;20(2):259-65.
53. Irving L, Neumark-Sztainer D. Integrating the prevention of eating disorders and obesity: feasibility of futile? Prev Med. 2002;34:299-309.
54. Neumark-Sztainer D. Obesity and eating disorder prevention: an integrated approach? Adolesc Med. 2003a February;14(1):159-73.
55. Neumark-Sztainer D. Can we simultaneously work toward the prevention of obesity and eating disorders in children and adolescents? Int J Eat Disord. 2005;38(3):220-7.
56. Neumark-Sztainer D, Wall M, Eisenberg ME, Story M, Hannan PJ. Overweight status and weight control behaviors in adolescents: Longitudinal and secular trends from 1999 to 2004. Preventive Medicine. 2006c;43(1):52-9.
57. Campos P, Saguy A, Ernsberger P, Oliver E, Gaesser G. The epidemiology of overweight and obesity: public health crisis or moral panic? Int J Epidemiol. 2006;35:55-60.
58. Public Health Agency of Canada. Healthy Living Strategy. 2007a [cited September 11]; Available from: http://www.phac-aspc.gc.ca/hl-vs-strat/index.html
59. CIHR-INMD. Addressing Childhood Obesity: The Evidence for Action. 2007 [cited August 3]; Available from: http://www.cihr-irsc.gc.ca/e/23293.html
60. Raine K. Overweight and Obesity in Canada. Ottawa: Canada Institute for Health Information; 2004 August.
61. Health Canada. Eating well with Canada's food guide. 2007 [cited September 8]; Available from: http://www.hc-sc.gc.ca/fn-an/food-guide-aliment/index_e.html
62. Public Health Agency of Canada. Canada's Physical Activity Guide to Healthy Active Living. 2007b [cited October 1]; Available from: http://www.phac-aspc.gc.ca/pau-uap/paguide/intro.html
63. Canadian Paediatric Society. Healthy active living for children and youth. 2002 [cited July 30]; Available from: http://www.cps.ca/english/statements/HAL/HAL02-01.htm
64. Nestle M, Jacobson M. Halting the obesity epidemic: a public health policy approach. Obesity. 2000;115.
65. Kaiser Family Foundation. The role of media in childhood obesity. Washington DC: The Henry J. Kaiser Family Foundation; 2004 February.
66. Battle E, Brownell K. Confronting a rising tide of eating disorders and obesity: treatment vs. prevention and policy. Addict Behav. 1996;21(6):755-65.
67. Davey RC. The obesity epidemic: too much food for thought? Br J Sports Med. 2004;38:360-3.
68. Lobstein T. Comment: preventing child obesity - an art and a science. Obes Rev. 2006;7(Suppl1):1-5.
69. CBC. Quebec expels fatty foods, fizzy drinks from schools. 2007 [cited September 14]; Available from: http://www.cbc.ca/canada/montreal/story/2007/09/14/qc-junkfood0914.html
70. Cohen L, Perales D, Steadman C. The O word: why the focus on obesity is harmful to community health. Calif J Health Promot. 2005;3(3):154-61.
71. Picaud R. Fit 4 Free. A culture's obsession with body size, rather than health. 2007 [cited August 19]; Available from: http://www.fit4free.org/body%20size%20obsession.htm
72. Centre for Science in the Public Interest. [cited October 2]; Available from: http://www.cspinet.org/
73. http://www.newswire.ca/en/releases/archive/february2008/06/c7501.html
74. http://www.commercialfreechildhood.org/news/shytony.htm
75. Advertising Standards Canada. ASC participates in industry launch of initiatives regarding children's advertising. 2007 [cited August 16]; Available from: http://www.adstandards.com/en/clearance/clearanceAreas/childrensInitiative.asp
76. Eriksen M. Are there public health lessons that can be used to help prevent childhood obesity? Health Educ Res. 2006.
77. Harvard Medical School. Is obesity a mental health issue? Harvard Mental Health Letter. 2004 October;21(4).
78. Alberta Medical Association. Alberta Doctors' Digest. July/August 2007 [cited August 30]; Available from: http://www.albertadoctors.org/bcm/ama/ama-website.nsf/AllDoc/
79. Summerbell C, Ashton V, Campbell K, Edmunds L, Kelly S, Waters E. Interventions for treating obesity in children: The Cochrane Collaboration; 2007b.
80. Stice E, Shaw H, Marti C. A meta-analytic review of obesity prevention programs for children and adolescents: the skinny on interventions that work. Psychol Bull. 2006a;132(5):667-91.
81. Padwal R, Li S, Lau D. Long-term pharmacotherapy for obesity and overweight: The Cochrane Collaboration; 2007.
81a. Blair SN, LaMonte MJ. Commentary: Current perspectives on obesity and health: black and white, or shades of grey? Int J Epidemiol 2006;35:69-72.

82. National Task Force on the Prevention and Treatment of Obesity. Dieting and development of eating disorders in overweight and obese adults. Arch Intern Med. 2000;160(17):2581-9.
83. Epstein L, Paluch R, Saelens B, Ernst M, Wifley D. Changes in eating disorder symptoms with pediatric obesity treatment. J Pediatr. 2001;139(1):13-4.
84. Butryn M, Wadden T. Treatment of overweight in children and adolescents: does dieting increase the risk of eating disorders. Int J Eat Disord. 2005;37(4):285-93.
85. CPS, Findlay S, Frappier J, McMillan D, Sankaran K, Pinzon J, et al. Dieting in adolescence. Paediatr Child Health. 2004 September;9(7):487-91.
86. Copeland P. Commentary. Endocrinol Metab. 2006;2(12).
87. Tsai A, Wadden T. Systematic review: an evaluation of major commercial weight loss programs in the United States. Ann Intern Med. 2005;142:56-66.
88. Casey L, Crumley E. Addressing Childhood Obesity: The Evidence for Action: Canadian Association of Paediatric Health Centres, Paediatric Chairs of Canada, CIHR Institute of Nutrition Metabolism and Diabetes; 2004 January 12.
89. Kohn M, Rees J, Brill S, Fonesca H, Jacobson M, Katzman D, et al. Preventing and treating adolescent obesity: a position paper of the Society for Adolescent Medicine. J Adolesc Health. 2006;38(6):784-7.
90. Robison J. Health at every size: toward a new paradigm of weight and health. Med Gen Med. 2005;7(3):13.
91. Bacon L, Stern J, vanLoan M, Keim N. Size acceptance and intuitive eating improve health for obese, female chronic dieters. J Am Diet Assoc. 2005;105:929-36.
91a. Wadden TA, Foster GD, Sarwer,DB, Anderson DA, Gladis M, Sanderson RS, et al. Dieting and the development of eating disorders in obese women: results of a randomized controlled trial. Am J Clin Nutr 2004; 80; 560-8.
92. Nader P, O'brien M, Houts R, Bradley R, Belsky J, Crosnoe R, et al. Identifying risk for obesity in early childhood. Pediatrics. 2006;118(3):e594-e601.
93. Yanovski J. Rapid weight gain during infancy as a predictor of adult obesity. Am J Clin Nutr. 2003;77:1350-1.
94. O'Loughlin J, Gray-Donald K, Paradis G. One and two-year predictors of excess weight gain among elementary school children in multiethnic, low-income, inner-city neighborhoods. Am J Epidemiol. 2000;152:739-46.
95. Kumanyika S, Obarzanek E. Pathways to obesity prevention: report of a National Institutes of Health Workshop. Obes Res. 2003;11(10):1263-.
96. O'Dea J, Wilson R. Socio-cognitive and nutritional factors associated with body mass index in children and adolescents: possibilities for childhood obesity prevention. Health Educ Res. 2006;21(6):796-805.
97. Plotnikoff R, Williams P, Fein A. Effects of a school capacity-building intervention on children's heart health: evaluation of the Coalfields Healthy Heartbeat School Project in New South Wales, Australia. Health Education Journal. 1999;58:389-400.
98. Plotnikoff R, Bercovitz K, Rhodes R, Loucaides C, Karunamuni N. Testing a conceptual model related to weight prceptions, physical activity and smoking in adolescents. Health Educ Res. 2006:11.
99. Yager Z, O'Dea J. The role of teachers and other educators in the prevention of eating disorders and child obesity: what are the issues? Eat Disord. 2005;13:261-78.
100. Cross D, Miller M, Hearn L, Hendrie D. Building a portfolio of interventions: providing alternatives for the promotion of healthy weight among young children in Australia. 2007.
100a. Lawlor DA, Chaturvedi N. Treatment and prevention of obesity - are there critical periods for intervention? Int J Epidemiol 2006; 35:3-9.
101. Thomas H. Obesity prevention programs for children and youth: why are their results so modest? Health Educ Res. 2006;21(6):783-95.
102. Society for Nutrition Education. Guidelines for childhood obesity prevention programs: promoting healthy weight in children. J Nutr Educ Behav. 2003;35(1).
103. Veugelers P, Fitzgerald A. Effectiveness of school programs in preventing childhood obesity: a multi-level comparison. Am J Public Health. 2005a March;95(3):432-5.
104. Veugelers P. Prevention of Childhood Obesity: Can School Programs make a Difference? Presented in Edmonton; 2006.
105. Gortmaker S. Planet Health. 2007 [cited August 9]; Available from: http://www.hsph.harvard.edu/prc/proj_planet.html
106. Neumark-Sztainer D. New moves: a school-based obesity prevention program for adolescent girls. Prev Med. 2003b;37(1):41-51.
107. Austin S, Field A, Wiecha J, Peterson K, Gortmaker S. The impact of a school-based obesity prevention trial on disordered weight-control behaviors in early adolescent girls. Arch Pediatr Adolesc med. 2005;159:225-30.
108. Austin S, Kim J, Wiecha J, Troped P, Feldman H, Peterson K. School-based overweight preventative intervention lowers incidence of disordered weight-control behaviors in early adolescent girls. Arch Pediatr Adolesc Med. 2007;161(9):865-9.
109. APA. Diagnostic and Statistical Manual of Mental Disorders DSM-IV American Psychiatric Association; 2004.
110. Mond J, Hay P, Rodgers B, Owen C. An update on the definition of "excessive exercise" in eating disorders research. Int J Eat Disord. 2005;39(2):147-53.
111. Kids Health. Compulsive exercise. 2007 [cited August 9]; Available from: http://www.kidshealth.org/parent/emotions/behavior/compulsive_exercise.html
112. Golden N, Katzman D, Kreipe R, Stevens S, Sawyer S, Rees J, et al. Eating disorders in adolescents: position paper of the Society for Adolescent Medicine. J Adolesc Health. 2003;33:496-503.
112a. American Academy of Pediatrics. Policy Statement: Identifying and Treating Eating Disorders. Pediatrics 2003; 111:204-11.
113. Hudson J, Hiripi E, Pope H, Kessler R. The prevalence and correlates of eating disorders in the National Comorbidity Survey Replication. Biol Psychiatry. 2007;61:348-58.
114. Berkman N, Bulik C, Brownley K, Lohr K, Sedway J, Rooks A, et al. Management of eating disorders. Rockville: AHRQ; 2006.
115. Hoek H, vanHoeken D. Review of the prevalence and incidence of eating disorders. Int J Eat Disord. 2003;34:383-96.
116. Keski-Rahkonen A, Hoek HW, Susser ES, Linna MS, Sihvola E, Raevuori A, et al. Epidemiology and course of anorexia nervosa in the community. Am J Psychiatry. 2007 August;164(8):1259-65.
117. Garfinkel P, Lin E, Goering P, Spegg C, Goldbloom D, Kennedy S, et al. Bulimia nervosa in a Canadian community sample: prevalence and comparison of subgroups. Am J Psychiatry. 1995 July;152(7):1052-8.
118. Currin L, Schmidt U, Treasure J, Jick H. Time trends in eating disorder incidence. Br J Psychiatry. 2005;186:132-5.

119. Eagles J, Johnston M, Hunter D, Lobban M, Millar H. Increasing incidence of anorexia nervosa in the female population of Northeast Scotland. Am J Psychiatry. 1995 September;152(9):1266-71.
120. Milos G, Spindler A, Schnyder U, Martz J, Hoek H, Willi J. Incidence of severe anorexia nervosa in Switzerland: 40 years of development. Int J Eat Disord. 2004;35:250-8.
121. Government of Canada. The Human Face of Mental Health and Mental Illness in Canada. 2006.
122. Peebles R, Wilson J, Lock J. How do children with eating disorders differ from from adolescents with eating disorders at initital evaluation? J Adolesc Health. 2006;39:800-5.
123. Steiger H, Bruce K. Phenotypes, endophenotypes, and genotypes in bulimia spectrum eating disorders. Can J Psychiatry. 2007a;52(4):220-7.
124. Lee H, Lee E, Pathy P, Chan Y. Anorexia nervosa in Singapore: an eight-year retrospective study. Singapore Med J. 2005;46(6):275-81.
125. Hoek H, Bartelds A, Bosveld J, vanderGraaf Y, Limpens V, Maiwald M, et al. Impact of urbanization on detention rates of eating disorders. Am J Psychiatry. 1995 September;152(9):1272-8.
126. Toselli A, Villani S, Ferro A, Verri A, Cucurullo L, Marinoni A. Eating disorders and their correlates in high school adolescents of Northern Italy. Epidemiol Psychiatr Soc. 2005;14(2):91-9.
127. Nevonen L, Norring C. Socio-economic variables and eating disorders: a comparison between patients and normal controls. Eat Weight Disord. 2004 December;9(4):279-84.
128. Rodriguez M, Novalbos R, Martinez N, Escobar J, Castro D. Epidemiological study of the influence of family and socioeconomic status in disorders of eating behaviour. Eur Clin Nutr. 2004;58(6):846-52.
129. Miller M, Pumariega A. Culture and eating disorders: a historical and cross-cultural review. Psychiatry. 2001 Summer;64(2):93-110.
130. Jennings S, Forbes D, McDermott B, Juniper S, Hulse G. Acculturation and eating disorders in Asian and Caucasian Australian adolescent girls. Psychiatr Clin Neurol. 2005;59(1):56-61.
131. Treasure J. Getting beneath the phenotype of anorexia nervosa: the search for viable endophenotypes and genotypes. Can J Psychiatry. 2007;52(4):212-9.
132. Steiger H. Eating disorder paradigms for the new millenium: do "attachment" and "culture" appear on brain and genome scans? Can J Psychiatry. 2007b;52(4):209-11.
133. Jacobi C, Hayward C, deZwaan M, Kraemer H, Agras W. Coming to terms with risk factors for eating disorders: application of risk terminology and suggestions for a general taxonomy. Psychol Bull. 2004;130(1):19-65.
134. deGroot J, Rodin G. The relationship between eating disorders and childhood trauma. Psychiatr Ann. 1999;29(4):225-9.
135. Smolak L, Murnen S. A meta-analytic examination of the relationship between child sexual abuse and eating disorders. Int J Eat Disord. 2002;31(2):136-50.
136. Orbach S. Commentary: there *is* a public health crisis - it's not fat on the body but fat in the mind and the fat of profits. Int J Epidemiol. 2006;35:67-9.
137. Davis C. Eating disorders and hyperactivity: a psychobiological perspective. Can J Psychiatry. 1997 March;42:168-75.
138. Southgate L, Tchanturia K, Treasure J. Building a model of the aetiology of eating disorders by translating experimental neuroscience into clinical practice. J Ment Health. 2005 December;14(6):553-66.
139. Keel P, Klump K. Are eating disorders culture bound syndromes? Implications for conceptualizing their etiology. Psychol Bull. 2003;129(5):747-69.
140. Mehler P, Krantz M. Anorexia nervosa. Medical issues. J Womens Health. 2003;12(4):331-40.
141. Katzman D. Medical complications in adolescents with anorexia nervosa: a review of the literature. Int J Eat Disord. 2005;37:S52-S9.
142. WHO. Burden of Disease Project. 2007 [cited September 20]; Available from: http://www.who.int/healthinfo/bodproject/en/index.html
142a. Jones L, Halford W, Dooley R. Long term outcome of anorexia nervosa. Behaviour Change 1993; 10:93-102.
143. Birmingham C, Su J, Hlynsky J, Goldner E, Gao M. The mortality rate from anorexia nervosa. Int J Eat Disord. 2005 September;38(2):143-6.
144. LeGrange D, Loeb K. Early identification and treatment of eating disorders: prodrome to syndrome. Early Int Psychiatr. 2007;1:27-39.
145. de la Rie S, Noordenbos G, vanFurth E. Quality of life and eating disorders. Qual Life Res. 2005a;14:1511-22.
146. Hay P, Mond J. How to 'count the cost' and measure burden? A review of health-related quality of life in people with eating disorders. J Ment Health. 2005;14(6):539-52.
147. Doll H, Peterson S, Stewart-Brown S. Eating disorders and emotional and physical well-being: associations between student self-reports of eating disorders and quality of life as measured by the SF-36. Qual Life Res. 2005;14:705-17.
148. Adair CE, Marcoux G, Cram B, Ewashen C, Chafe J, Cassin S, et al. Development and multi-site validation of a new condition-specific quality of life measure for eating disorders. Health Qual Life Outcomes. 2007;5(23).
149. Simon J, Schmidt U, Pilling S. The health service use and cost of eating disorders. Psychol Med. 2005 November;35(11):1543-51.
150. Su J, Birmingham C. Anorexia nervosa: the cost of long-term disability. Eat Weight Disord. 2003 March;8(1):76-9.
151. Decker S. Escaping obsessions. Program offers hope to city anorexics. Edmonton Sun. 2005 Friday July 8.
152. Striegel-Moore R, Leslie D, Petrill S, Garvin V, Rosenheck R. One-year use and cost of inpatient and outpatient services among female and male patients with an eating disorder: evidence from a national database of health insurance claims. Int J Eat Disord. 2000;27:381-9.
153. Hillege S, Beale B, McMaster R. Impact of eating disorders on family life: individual parents' stories. J Clin Nurs. 2006;15(8):1016-22.
154. de la Rie S, Vanfurth E, DeKoning A, Noordenbos G, Donker M. The quality of life of family caregivers of eating disorder patients. Eat Disord. 2005b July;13(4):345-51.
155. Treasure J. The experience of caregiving for severe mental illness: a comparison between anorexia nervosa and psychosis. Soc Psychiatry Psychiatr Epidemiol. 2001;36:343-7.

156. Neumark-Sztainer D, Levine M, Paxton S, Smolak L, Piran N, Wertheim E. Prevention of body dissatisfaction and disordered eating: what next? Eat Disord. 2006d;14:265-85.
157. Health Canada. A Report on Mental Illness in Canada. Ottawa; 2002.
158. Hay P. 2007 [cited April 30]; Available from: http://www.abc.net.au/am/content/2007/s1909684.htm
159. Neumark-Sztainer D, Hannan P, Perry C, Irving L. Weight-related concerns and behaviors among overweight and nonoverweight adolescents. Arch Pediatr Adolesc Med. 2002 February;156:171-8.
160. O'Dea J. Evidence for a self-esteem approach in the prevention of body image and eating problems among children and adolescents. Eat Disord. 2004b;12:225-39.
161. Daee A, Robinson P, Lawson M, Turpin J, Gregory B, Tobias J. Psychologic and physiologic effects of dieting in adolescents. South Med J. 2002;95(9):1032-41.
162. Austin S. Population-based prevention of eating disorders: an application of the Rose Prevention model. Prev Med. 2001;32:268-83.
163. Patton G, Johnson-Sabine E, Wood K, Mann A, Wakeling A. Abnormal eating attitudes in London schoolgirls-a prospective epidemiological study: outcome at twelve month follow-up. Psychol Med. 1990;20:383-94.
164. Patton G, Selzer R, Coffey C, Carlin J, Wolfe R. Onset of adolescent eating disorders: population based cohort study over 3 years. BMJ. 1999 March 20;318:765-8.
165. World Health Organization. Health Behaviour in School-aged Children. A World Health Organization Collaborative Cross-national Study. 2007 [cited August 18]; Available from: http://www.hbsc.org/
166. Statistics Canada. National Longitudinal Survey of Children and Youth: participation in activities. 2001 [cited 2007 October 17]; Available from: http://www.statcan.ca/Daily/English/010530/d010530a.htm
167. Canadian Institute for Health Information. Battling obesity more than simply telling Canadians to “eat right and exercise”. 2006 [cited February 15]; Available from: http://secure.cihi.ca/cihiweb/dispPage.jsp?cw_page=media_15feb2006_e
168. Field A, Camargo C, Taylor C, Berkley C, Roberts S, Colditz G. Peer, parent, and media influences on the development of weight concerns and frequent dieting among preadolescent and adolescent girls and boys. Pediatrics. 2001;107(1):54-60.
169. McVey G, Tweed S, Blackmore E. Dieting among preadolescent and young adolescent females. CMAJ. 2004b May 11;170(10):1559-61.
170. McVey G, Tweed S, Blackmore E. Correlates of dieting and muscle-gaining behavior in 10- to 14-year-old males and females. Prev Med. 2005b;40:1-9.
171. Jones J, Bennett S, Olmsted M, Lawson M, Rodin G. Disordered eating attitudes and behaviours in teenaged girls: a school-based study. CMAJ. 2001 September 4;165(5):547-52.
172. Field A, Austin S, CamargoJr C, Taylor C, Striegel-Moore R, Loud K, et al. Exposure to the mass media, body shape concerns, and use of supplements to improve weight and shape among male and female adolescents. Pediatrics. 2005b;116(2):e214-20.
173. Neumark-Sztainer D, Wall M, Haines J, Story M, Sherwood N, vandenBerg P. Shared risk and protective factors for overweight and disordered eating in adolescents. Am J Prev Med. 2007b;33(5):359-69.
174. Neumark-Sztainer D, Paxton SJ, Hannan PJ, Haines J, Story M. Does Body Satisfaction Matter? Five-year Longitudinal Associations between Body Satisfaction and Health Behaviors in Adolescent Females and Males. Journal of Adolescent Health. 2006b;39(2):244-51.
175. Haines J, Neumark-Sztainer D. Prevention of obesity and eating disorders: a consideration of shared risk factors. Health Educ Res. 2006c;21(6):770-82.
176. Haines J, Neumark-Sztainer D, Eisenberg M, Hannan P. Weight teasing and disordered eating behaviors in adolescents: longitudinal findings from Project EAT (eating among teens). Pediatrics. 2006b;117(2):e209-e15.
177. Davison K, Birch L. Weight status, parent reaction, and self-concept in five-year-old girls. Pediatrics. 2001;107(1):46-53.
178. Davison K, Markey C, Birch L. A longitudinal examination of patterns in girls' weight concerns and body dissatisfaction from ages 5 to 9 years. Int J Eat Disord. 2003;33:320-32.
179. Schur E, HansSteiner M. Body dissatisfaction and dieting in young children. Int J Eat Disord. 2000;27(1):74-82.
180. Dohnt H, Tiggemann M. The contribution of peer and media influences to the development of body satisfaction and self-esteem in young girls: a prospective study. Dev Psychol. 2006;42(5):929-36.
181. McLaren L, Kuh D. Body dissatisfaction in midlife women. J Women Aging. 2004a;16:35-54.
182. Stice E, Shaw H. Role of body dissatisfaction in the onset and maintenance of eating pathology. A synthesis of research findings. J Psychosom Res. 2002;53:985-93.
183. Russell-Mayhew A. The last word. Eat Disord. 2006;14:253-63.
184. Myers P, Biocca F. The elastic body image: the effect of television advertising and programming on body image distortions in young women. J Commun. 1992;42(3):108-33.
185. Stice E, Cameron R, Killen J, Hayward C, BarrTaylor C. Naturalistic weight-reduction efforts prospectively predict growth in relative weight and onset of obesity among female adolescents. J Consult Clin Psychol. 1999;67(6):967-74.
186. Field A, Austin S, Taylor C, Malspeis S, Rosner B, Rockett H, et al. Relation between dieting and weight change among preadolescents and adolescents. Pediatrics. 2003 October;112(4):900-6.
187. Stice E. Researchers question validity of dieting measures. 2005 [cited 2007 October 20]; Available from: http:www.apa.org/monitor/apr05/validity.html
188. Neumark-Sztainer D, Wall M, Guo J, Story M, Haines J, Eisenberg M. Obesity, disordered eating, and eating disorders in a longitudinal study of adolescents: how do dieters fare 5 years later? J Am Diet Assoc. 2006a;106(4):559-68.
189. Neumark-Sztainer D, Wall M, Haines J, Story M, Eisenberg ME. Why does dieting predict weight gain in adolescents? Findings from Project EAT-II: A 5-Year Longitudinal Study. J Am Diet Assoc. 2007a;107(3):448-55.
190. Senf J, Shisslak C, Crago M. Does dieting lead to weight gain? a four-year longitudinal study of middle school girls. Obesity. 2006;14:2236-41.
191. Stice E, Martinez E, Presnell K, Groesz L. Relation of successful dietary restriction to change in bulimic symptoms: a prospective study of adolescent girls. Health Psychol. 2006b;25(3):274-81.
192. Stice E, Fisher M, Lowe M. Are dietary restraint scales valid measures of acute dietary restriction? Unobtrusive observational data suggest not. Psychol Assess. 2006c;18(1):89-94.

193. Pritts S, Susman J. Diagnosis of eating disorders in primary care. Am Fam Physician. 2003;67(2).
194. Cotton M, Ball C, Robinson P. Four simple questions can help screen for eating disorders. J Gen Intern Med. 2003;18(1):53-6.
195. D'Souza C, Forman S, Austin S. Follow-up evaluation of a high school eating disorders screening program: knowledge, awareness and self-referral. J Adolesc Health. 2005;36(3):208-13.
196. CBC. Super-thin models banned from Montreal fashion week. 2007 [cited October 2]; Available from: http://www.cbc.ca/health/story/2007/10/02/fashion-bmi.html
197. Wilson E. Health guidelines suggested for models. The New York Times. 2007 January 6.
198. Yahoo News. The alliance for eating disorders awareness calls upon Apple Inc. to change new IMAC campaign claiming that, "you can't be too thin. Or too powerful". 2007 [cited September 6]; Available from: http://news.yahoo.com/s/prweb/20070820/bs_prweb/prweb547551_1
199. Pritchard S. Cruel pursuit of stick women. 2003 [cited 2007 August 13]; Available from: http://observer.guardian.co.uk/readerseditor/story/0,,1080958,00.html
200. Dove Campaign for Real Beauty. [cited August 28]; Available from: http://www.campaignforrealbeauty.ca/flat2.asp?id=6960
201. The Body Positive. 2007 [cited August 28]; Available from: http://www.thebodypositive.org/page-view.php?record_id=2
202. Austin S. Prevention research in eating disorders: theory and new directions. Psychol Med. 2000;30:1249-62.
203. Larkin J, Rice C. Beyond "healthy eating" and "healthy weights": harassment and the health curriculum in middle schools. Body Image. 2005;2:219-32.
204. Jade D. Eating disorders and the media. National Centre for Eating Disorders, 2002. [cited 2007 October 5]; Available from http://www.eating-disorders.org.uk/info.htm
205. OCOPED. Ontario Community Outreach Program for Eating Disorders. [cited 2007 October 11]; Available from: http://www.ocoped.ca/
206. The Student Body: Promoting Health at Any Size. [cited 2007 October 11]; Available from: http://research.aboutkidshealth.ca/thestudentbody/home.asp
207. McVey G. The Student Body: Promoting Health at any Size. 2007b [cited 2007 October 11]; Available from: http://research.aboutkidshealth.ca/thestudentbody/home.asp
208. McVey G, Davis R, Kaplan A, Katzman D, Pinhas L, Geist R, et al. A community-based training program for eating disorders and its contribution to a provincial network of specialized services. Int J Eat Disord. 2005a;37(Suppl):S35-S40.
209. Body Image Coalition of Peel. [cited 2007 October 11]; Available from: http://www.bodyimagecoalition.org/
210. Seaver A, McVey G, Fullerton Y, Stratton L. "Every BODY is a somebody": an active learning program to promote healthy body image, positive self-esteem, healthy eating and an active lifestyle for adolescent females: Teachers Guide: Body Image Coalition of Peel; 1997.
211. McVey G, Lieberman M, Voorberg N, Wardrope D, Blackmore E. School-based peer support groups: a new approach to the prevention of disordered eating. Eat Disord. 2003a;11:169-86.
212. McVey G, Lieberman M, Voorberg N, Wardrope D, Blackmore E, Tweed S. Replication of a peer support program designed to prevent disordered eating: is a life skills approach sufficient for all middle school students? Eat Disord. 2003b;11:187-95.
213. Bodysense. [cited 2007 October 11]; Available from: http://www.bodysense.ca/
214. Buchholz A, Mack H, McVey G. An evaluation of the prevention project BODYSENSE: a positive body image initiative for female athletes. 2007.
215. Derenne J, Beresin E. Body image, media, eating disorders. Acad Psychiatry. 2006;30(3):257-61.
216. Media literacy and preventing eating disorders: an interview with Michael Levine, Ph.D. 2003 [cited 2007 August 6]; Available from: http://www.mediaed.org/news/articles/levine
217. Wilson G, Shafran R. Eating disorders guidelines from NICE. Lancet. 2005;365:79-81.
218. Yager J, Devlin M, Halmi K, Herzog D, Mitchell J, Powers P, et al. Practice Guideline for the Treatment of Patients with Eating Disorders. 3rd ed. Washington DC: American Psychiatric Association; 2006.
219. Currin L, Waller G, Treasure J, Nodder J, Stone C, Yeomans M, et al. The use of guidelines for dissemination of "Best Practice" in primary care of patients with eating disorders. Int J Eat Disord. 2007;40(5):000-.
220. Patient UK. Guidelines - Eating Disorders. 2007 [cited August 30]; Available from: http://www.patient.co.uk/showdoc/50000005
221. Miller P. Redefining success in eating disorders. Addict Behav. 1996;21(6):745-54.
222. Noordenbos G, Seubring A. Criteria for recovery from eating disorders according to patients and therapists. Eat Disord. 2006;14:41-54.
223. Levine M, Smolak L. Prevention of negative body image and disordered eating in children and adolescents: recent developments and promising directions. Book Chapter In Preparation, Gambier, OH; 2007.
224. Taylor C, Bryson S, Luce K, Cunning D, Doyle A, Abascal L, et al. Prevention of eating disorders in at-risk collage-age women. Arch Gen Psychiatry. 2006;63:881-8.
225. Abascal L, Brown J, Winzelberg A, Dev P, Taylor C. Combining universal and targeted prevention for school-based eating disorder programs. Int J Eat Disord. 2004;35:1-9.
226. Heinicke B, Paxton S, McLean S, Wertheim E. Internet-delivered targeted group intervention for body dissatisfaction and disordered eating in adolescent girls: a randomized controlled trial. J Abnorm Child Psychol. 2007;35:379-91.
227. Paxton S, McLean S, Gollings E, Faulkner C, Wertheim E. Comparison of face-to-face and internet interventions for body image and eating problems in adult women: an RCT. Int J Eat Disord. 2007.
228. McVey G, Tweed S, Blackmore E. Healthy schools - healthy kids: a controlled evaluation of a comprehensive universal eating disorder prevention program. Body Image. 2007a;4:115-36.
229. Piran N. Eating disorders: a trial of prevention in a high risk school setting. J Prim Prev. 1999;20(1).
230. Striegel-Moore R, Steiner-Adair C. Primary prevention of eating disorders: further considerations from a feminist perspective. In: Vandereycken W, Noordenbos G, editors. The Prevention of Eating Disorders. UK: Athlone Press; 1998. p. 1-22.
231. O'Dea J, Abraham S. Improving the body image, eating attitudes, and behaviors of young male and female adolescents: A new educational approach that focuses on self-esteem. Int J Eat Disord. 2000;28(1):43-57.
232. O'Dea J. School-based health education strategies for the improvement of body image and prevention of eating problems. An overview of safe and successful interventions. Health Educ. 2005b;105(1):11-33.

233. McVey G, Davis R. A program to promote positive body image: a 1-year follow-up evaluation. J Early Adolesc. 2002;22:96-108.
234. McVey G, Davis R, Tweed S, Shaw B. Evaluation of a school-based program designed to improve body image satisfaction, global self-esteem, and eating attitudes and behaviors: a replication study. Int J Eat Disord. 2004a;36:1-11.
235. Stice E, Shaw H. Eating disorder prevention. Psychol Bull. 2004;130(2):206-27.
236. Stice E, Shaw H, Marti C. A meta-analytic review of eating disorder prevention programs: encouraging findings. Annu Rev Clin Psychol. 2007;3:207-31.
237. Pratt B, Woolfenden S. Interventions for preventing eating disorders in children and adolescents: The Cochrane Collaboration; 2007.
238. Cohn L, Maine M. The last word; more harm than good. Eat Disord. 1998;6:93-5.
239. Moulding N. "Love your body, move your body, feed your body": discourses of self-care and social marketing in a body image health promotion program. Crit Publ Health. 2007;17(1):57-69.
240. Russell-Mayhew S. Preventing a continuum of disordered eating: going beyond the individual. Prev Res. 2007;14(3):7-10.
241. Paxton S. Prevention implications of peer influences on body image dissatisfaction and disturbed eating in adolescent girls. Eat Disord. 1996 Winter;4(4):334-47.
242. Moulding N, Hepworth J. Understanding body image disturbance in the promotion of mental health: a discourse analytic study. J Community Appl Soc Psychol. 2001;11:305-17.
243. Paquette M, Raine K. Sociocultural context of women's body image. Soc Sci Med. 2004;59:1047-58.
244. deGroot J, Bear M, National Eating Disorders Information Centre. Women and eating disorders. Women, Mental Health, Mental Illness and Addiction in Canada: An Overview 2006
245. Piran N, Levine M, Irving L. Go girls! Media literacy, activism and advocacy project. Healthy Weight J. 2000:89-90.
246. Haines J, Neumark-Sztainer D, Perry C, Hannan P, Levine M. V.I.K. (very important kids): a school-based program designed to reduce teasing and unhealthy weight-control behaviors. Health Educ Res. 2006a;21(6):884-95.
247. Bordo S. Unbearable Weight, Feminism, Western Culture, and the Body. Berkley: University of California Press; 1993.
248. Brumberg J. The Body Project: An Intimate History of American Girls. New York: Random House; 1997.
249. Wolf N. The Beauty Myth: How Images of Beauty are Used Against Women. London: Chatto and Windus; 1990.
250. de Groot JM, Rodin G. Eating disorders, female psychology and the self. J Am Acad Psychoanal 1994: 22:299-317.
250a. Rice C. Becoming "the fat girl": acquisition of an unfit identity. Women's Studies Int Forum 2007;30:158-74.
251. Novak M, Ahlgren C, Hammarstrom A. A life-course approach in explaining social inequity in obesity among adult men and women. Int J Obes. 2006;30(1):191-200.
252. Stunkard A, Sorenson T. Obesity and socio-economic status - a complex relation. NEJM. 1993:1036-7.
253. Falkner N, Neumark-Sztainer D, Story M, Jeffery R, Beuhring T, Resnick M. Social, educational, and psychological correlates of weight status in adolescents Obes Res. 2001;9(1):32-42.
254. Viner R, Cole T. Adult socio-economic, educational, social and psychological outcomes of childhood obesity: a national birth cohort study. BMJ. 2005;330:1-5.
255. Green K, Cameron R, Polivy J, Cooper K, Heatherington T. Weight dissatisfaction and weight loss attempts among Canadian adults. CMAJ. 1997;157(Suppl):S17-S25.
256. Woodside D, Garfinkel P, Lin E, Goering P, Kaplan A, Goldbloom D, et al. Comparisons of men with full or partial eating disorders, men without eating disorders, and women with eating disorders in the community. Am J Psychiatry. 2001;158:570-4.
257. Caralat D, Camargo C, Herzog D. Eating disorders in males: a report on 135 patients. Am J Psychiatry. 1997;154:1127-32.
258. Jonat L, Birmingham C. Disordered eating attitudes and behaviours in the high-school students of a rural Canadian community. Eat Weight Disord. 2004;9(4):285-9.
259. O'Dea J. Prevention of child obesity: 'first do no harm'. Health Educ Res. 2004a.
260. Ricciardelli L, McCabe M. A biopsychosocial model of disordered eating and the pursuit of muscularity in adolescent boys. Psychol Bull. 2004;130(2):179-205.
261. O'Loughlin J, Paradis G, Meshefedjian G, Eppel A, Belbraouet S, Gray-Donald K. Lifestyle risk factors for chronic disease by family origin among children in multiethnic, low-income, urban neighborhoods. Ethn Dis. 2004;14(3):340-50.
262. Wakeling A. Epidemiology of anorexia nervosa. Psychiatr Res. 1996;62:3-9.
263. Sobal J, Stunkard A. Socioeconomic status and obesity: a review of the literature. Psychol Bull. 1989;105:260-75.
264. Monteiro C, Moura E, Conde W, Popkin B. Socioeconomic status and obesity in adult populations of developing countries: a review. Bull World Health Organ. 2004;82:940-6.
265. Hawkes C. Uneven dietary development: linking the policies and processes of globalization with the nutrition transition, obesity and diet-related chronic diseases. Global Health. 2006;2.
266. Gard M, Freeman C. The dismantling of a myth: a review of eating disorders and socioeconomic status. Int J Eat Disord. 2006;20:1-12.
267. McClelland L, Crisp A. Anorexia nervosa and social class. Int J Eat Disord. 2001;29:150-6.
268. Ogden J, Thomas D. The role of familial values in understanding the impact of social class on weight concern. Int J Eat Disord. 1999;25(3):273-9.
269. O'Dea JA, Caputi P. Association between socioeconomic status, weight, age and gender, and the body image and weight control practices of 6- to 19-year-old children and adolescents. Health Educ Res. 2001 October;16(5):521-32.
270. Wardle J, Griffith J. Socioeconomic status and weight control practices in British adults. J Epidemiol Community Health. 2001 March 1;55(3):185-90.
271. Jeffery R, French S. Socioeconomic status and weight control practices among 20- to 45-year-old women. Am J Public Health. 1996;86:1005-10.
272. McLaren L, Kuh D. Women's body dissatisfaction, social class, and social mobility. Soc Sci Med. 2004b;58(9):1575-84.
273. Lynch E, Liu K, Spring S, Hankinson A, Wei G, Greenland P. Association of ethnicity and socioeconomic status with judgments of body size: the Coronary Artery Risk Development in Young Adults (CARDIA) study. AM J Epidemiol. 2007;165:1055-62.
274. Bourdieu P. A Social Critique of the Judgement of Taste. London: Routledge; 1984.
275. Shilling C. The Body and Social Theory. 2nd ed. London: Sage Publications; 2005.

276. Harrison K. Is "fat free" good for me? A panel study of television viewing and children's nutritional knowledge and reasoning. Health Commun. 2005a;17(2):117-32.
276a. Rhee, K. Childhood overweight and the relationship between parent behaviors, parenting style, and family functioning. Annals Am Acad Polit Soc Sci 2008;615:12-37.
277. Smolak L, Levine M, Schermer F. Parental input and weight concerns among elementary school children. Int J Eat Disord. 1999;25(3):263-71.
278. Field A, Austin S, Striegel-Moore R, Taylor C, CamargoJr C, Laird N, et al. Weight concerns and weight control behaviors of adolescents and their mothers. Arch Pediatr Adolesc Med. 2005a December;159(12):1121-6.
279. Paxton S, Eisenberg M, Neumark-Sztainer D. Prospective predictors of body dissatisfaction in adolescent girls and boys: a five-year longitudinal study. Dev Psychol. 2006;42(5):888-99.
280. Schutz H, Paxton S. Friendship quality, body dissatisfaction, dieting and disordered eating in adolescent girls. Br J Clin Psychol. 2007;46:67-83.
281.Needham B, Crosnoe R. Overweight status and depressive symptoms during adolescence. J Adolesc Health. 2005;36:48-55.
282. Wang S, Houshyar S. Adolescent girls' and boys' weight-related health behaviors and cognitions: associations with reputation - and preference-based peer status. Health Psychol. 2006;25(5):658-63.
283. Thompson J, Shroff H, Herbozo S, Cafri G, Rodriguez J, Rodriguez M. Relations among multiple peer influences, body dissatisfaction, eating disturbance, and self-esteem: a comparison of average weight, at risk of overweight, and overweight adolescent girls. J Pediatr Psychol. 2007;32(1):24-9.
284. Thompson JK, Heinberg L, Altabe MN, Tantleff-Dunn S. Exacting beauty: Theory, assessment, and treatment of body image disturbance. Washington: American Psychological Association 1999.
285. McLaren L, Kuh D, Hardy R, Gauvin L. Positive and negative body-related comments and their relationship with body dissaaged women. Psychol Health. 2004c;19(2):261-72.
286. Rand C, McGregor A. Morbidly obese patients' perceptions of social discrimination before and after surgery for obesity. South Med J. 1990;83:1390-5.
287. Public Health Agency of Canada. Eating disorders. In: A Report on Mental Illnesses in Canada 2002 [cited 2007 October 10]; Available from: http://www.phac-aspc.gc.ca/publicat/miic-mmac/chap_6_e.html
288. Latner J, Stundark A. Getting worse: the stigmatization of obese children. Obes Res. 2003;11(3):452-6.
289. Jeffrey R, Uter J. The changing environment and population obesity in the United States. Obes Res. 2003;11(Suppl):S12-S22.
290. North American Association for the Study of Obesity. [cited 2007 August 1]; Available from: http://www.naaso.org/
291. Barnouin K, Freedman R. Skinny Bitch. 2005 [cited August 24]; Available from: http://www.amazon.com/Skinny-Bitch/
292. Whyte K. Six feet tall, 115 lb., and talking about eating less and living longer. Maclean's. 2007 January 15 2007.
293. Wertheim E, Paxton S, Schutz H, Muir S. Why do adolescent girls watch their weight? An interview study examining sociocultural pressures to be thin. J Psychosom Res. 1997;42(4):345-55.
294. Harrison K. The body electric: thin-ideal media and eating disorders in adolescents. J Commun. 2000:119-43.
295. Bessenoff G, Snow D. Absorbing society's influence: body image self-discrepancy and internalized shame. Sex Roles. 2006a;54.
296. Bessenoff G. Can the media affect us? Social comparison, self-discrepancy, and the thin ideal. Psychol Women Q. 2006b September;30(3):239-51.
297. Hamilton E, Mintz L, Kashubeck-West S. Predictors of media effects on body dissatisfaction in European American women. Sex Roles. 2007;56:397-402.
298. Hargreaves D, Tiggemann M. Longer-term implications of responsiveness to 'thin-ideal' television: support for a cumulative hypothesis of body image disturbance? Eur Eat Disorders Rev. 2003;11:465-77.
299. Groesz L, Levine M, Murnen S. The effect of experimental presentation of thin media images on body satisfaction: a meta-analytic review. Int J Eat Disord. 2002;31:1-16.
300. Holmstrom A. The effects of media on body image: a meta-analysis. J Broadcast Electronic Media. 2004;48(2):196-217.
301. Harrison K, Hefner V. Media exposure, current and future body ideals, and disordered eating among preadolescent girls: a longitudinal panel study. J Youth Adolesc. 2006;35(2):153-63.
302. Becker A, Burwel R, Gilman S, Herzog D, Hamburg P. Eating behaviors and attitudes following prolonged exposure to television among ethnic Fijian adolescent girls. Br J Psychiatry. 2002;180:509-14.
303. Harrison K, Marske A. Nutritional content of foods advertised during the television programs children watch most. Am J Public Health. 2005b;95(9):1568-74.
304. Hastings G, Stead M, McDermott L, Forsyth A, MacKintosh A, Rayner M, et al. Review of research on the effects of food promotion to children: Centre for Social Marketing; 2003.
304a. Jordan AB, Robinson TN. Children, television viewing and weight status: summary and recommendations from an expert panel meeting. Annals Am Acad Polit Soc Sci 2008;615:119-
305. Marwick R. Target market: children as consumers. About Kids Health [cited 2007 September 5]; Available from: http://www.aboutkidshealth.ca/News/Target-market-Children-as-consumers.aspx?articleID=8143&categoryID=news-type
306. Tanski S. Silver screen may encourage teen smoking. Arch Pediatr Adolesc Med. 2007;161:849-56.
307. Robinson T, Borzekowski D, Matheson D, Kraemer H. Effects of fast food branding on young children's taste preferences. Arch Pediatr Adolesc Med. 2007;161(8):792-7.
308. Schlosser E. Fast Food Nation. London: Penguin Books; 2002.
309. Spurlock M. Supersize me. 2004 [cited August 24]; Available from: http://en.wikipedia.org/wiki/Super_Size_Me
310. Zeckhausen D. Full Mouse, Empty Mouse: A Tale of Food and Feelings. Washington DC: APA; 2007.
311. Wikipedia. Fat acceptance movement. 2007 [cited September 14]; Available from: http://en.wikipedia.org/wiki/sizeism
312. National Association to Advance Fat Acceptance. [cited August 14]; Available from: http://www.naafa.org/
313. Norris M, Boydell K, Pinhas L, Katzman D. Ana and the internet: a review of pro-anorexia websites. Int J Eat Disord. 2006;39(6):443-7.
314. Harris M, CanWest. Thousands of pro-anorexia videos posted to Internet. 2007 [cited August 15]; Available from: http://www.canada.com/nationalpost/news/story.html?id=1ede95e6-0109-4282-bc92-51952332e1b4&k=66995

315. Government of Canada. Healthy Canadians. Your Source for a Healthier Lifestyle. [cited 2007 September 4]; Available from: http://www.healthycanadians.gc.ca/index_e.html
316. CDC. Youth Media Campaign - verb. 2007 [cited October 18]; Available from: http://www.cdc.gov/youthcampaign/
317. Go for 2&5. [cited 2007 October 12]; Available from: http://www.gofor2and5.com.au/
318. Durkin S, Paxton S, Wertheim E. How do adolescent girls evaluate body dissatisfaction prevention messages? J Adolesc Health. 2005;37:381-90.
319. Veugelers P, Fitzgerald A. Prevalence of and risk factors for childhood overweight and obesity. CMAJ. 2005b;173(6):607-13.
320. Plotnikoff R, Mayhew A, Birkett N, Loucaides C, Fodor G. Age, gender, and urban-rural differences in the correlates of physical activity. Prev Med. 2004;39:1115-25.
321. Loucaides C, Plotnikoff R, Bercovitz K. Differences in the correlates of physical activity between urban and rural Canadian youth. J Sch Health. 2007;77(4):164-70.
322. Irving H, Adalf E, Allison K, Paglia A, Dwyer J, Goodman J. Trends in vigorous physical activity participation among Ontario adolescents. Can J Public Health. 2003;94(4):272-4.
323. O'Dea J. Why do kids eat healthful food? Perceived benefits of and barriers to healthful eating and physical activity among children and adolescents. J Am Diet Assoc. 2003;103:497-501.
324. Papas M, Alberg A, Ewing R, Helzlsouer K, Gary T, Klassen A. The built environment and obesity. Epidemiol Rev. 2007;29:129-43.
325. Ball K. People, places ... and other people? Integrating understanding of intrapersonal, social and environmental determinants of physical activity. J Sci Med Sport. 2006b;9:367-70.
326. Davey RC. The obesity epidemic: too much food for thought? Br J Sports Med. 2004;38:360-3.
327. Gray-Donald K. Food habits of Canadians: reduction in fat intake over a generation. Can J Public Health. 2000;91:381-5.
328. Rennie K, Jebb S, Wright A, Coward W. Secular trends in under-reporting in young people. Br J Nutr. 2005;93(2):241-7.
329. Drewnowski A. The real contribution of added sugars and fats to obesity. Epidemiol Rev. 2007;29:160-71.
330. Phillips S, JacobsStarkey L, Gray-Donald K. Food habits of Canadians: food sources of nutrients for the adolescent sample. Can J Diet Pract Res. 2004;65(2):81-4.
331. Traister R. The girth of a nation. 2007 [cited August 9]; Available from: http://dir.salon.com/story/mwt/feature/2004/06/29/obesity_myth/index.html
332. Carnell S, Edwards C, Crocker H, Boniface D, Wardle J. Parental perceptions of overweight in 3-5 y olds. Int J Obes. 2005;29(4):353-5.
332a. Cummins S, Macintyre S. Food environments and obesity - neighbourhood or nation? Int J Epidemiol 2006;35:100-104.
333. Hawkes C. The role of foreign direct investment in the nutrition transition. Pblic Health Nutr. 2004;8:357-65.
334. Ludwig D, Ebbeling C. Overweight children and adolescents. N Engl J Med. 2005;353(10).
335. Striegel-Moore R. The impact of pediatric obesity treatment on eating behavior and psychologic adjustment. J Pediatr. 2001;139:13-4.
336. CBC. Anti-obesity talk may have unintended effect on dieting girls: psychologist. 2004 [cited August 3]; McVey and Berell]. Available from: http://www.cbc.ca/health/story/2004/05/10/girls_diet040510.html
337. Johnston J. Eating disorders and childhood obesity: who are the real gluttons? CMAJ. 2004 December 7;171(12):1459-60.
338. Cameron J. Self-esteem changes in children enrolled in weight management programs. Compr Pediatr Nurs. 1999;22:75-85.
339. Fishbein M, Hall-Jamieson K, Zimmer E, vonHaeften I, Nabi R. Avoiding the boomerang: testing the relative effectiveness of antidrug public service announcements before a national campaign. Am J Public Health. 2002;92(2):238-45.
340. GirlPower. Girl Power! Facts about eating disorders. 2007 [cited August 16]; Available from: http://www.girlpower.gov/girlarea/bodywise/eatingdisorders/define.htm
341. O'Dea J. Can body image education programs be harmful to adolescent females? Eat Disord. 2002;10:1-13.
342. Dietz W. Implications and treatment of adolescent obesity. Clinical Nutrition. 1985;4:103-8.
343. Shaw H, Ng J, Stice E. Integrating eating disorder and obesity prevention programs for adolescents. Prev Res. 2007c;14(3):18-20.

Additional Readings

- Campos P. Saguy A, Ernserger P, Oliver E, Gaesser G. Int J Epidemiol 2006; 35:55-60. The epidemiology of overweight and obesity: public health crisis or moral panic? Including the rebuttal by Kim S. and Popkin, BM and all subsequent commentaries in that issue.
- Gard M, Wright J (Eds.) The Obesity Epidemic: Science and Ideology. London: Routledge, 2005.