

DISORDERED EATING BEHAVIOUR AND DEPRESSIVE SYMPTOMS  
AMONG NOVA SCOTIA YOUTH

by

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## ABSTRACT

Prevalence rates for adolescent depressive symptoms differ significantly between males and females. Explanatory models are unable to adequately clarify why this difference exists. To enhance understanding of gender differences, the role of intrapersonal risk factors body dissatisfaction (BD) and disordered eating behaviour (DEB) were investigated using secondary data from a sample of high school students from industrial Cape Breton, Nova Scotia. Results showed that 32.4% of females and 20.6% of males experienced depressive symptoms over the past week. Both genders were at an increased risk for depressive symptoms if they had BD (OR male 1.71, OR female 1.39) or DEB (OR male 3.35, OR female 3.40). Findings indicated that males and females shared similar rather than differing risk behaviour profiles in relation to depressive symptoms with respect to DEB.

## LIST OF ABBREVIATIONS USED

<b>BD</b>	Body Dissatisfaction
<b>CAS</b>	Canadian Addiction Survey
<b>CCHS</b>	Canadian Community Health Survey
<b>CES-D</b>	Center for Epidemiological Studies Depression Scale
<b>CI</b>	Confidence Interval
<b>DEB</b>	Disordered Eating Behaviour
<b>GAM</b>	Gender Additive Model
<b>GLB</b>	Gay, Lesbian, Bisexual
<b>GPA</b>	Grade Point Average
<b>HBSC</b>	Health Behaviour in School-Aged Children
<b>MDD</b>	Major Depressive Disorder
<b>MDE</b>	Major Depressive Episode
<b>OR</b>	Odds Ratio
<b>SES</b>	Socio-Economic Status

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## **Chapter 1.0 Introduction**

Subclinical depressive symptoms are an issue of great concern to the health of adolescents, and one that requires further inquiry.<sup>1,2,3</sup> Research confirms that previous depressive symptoms are one of the strongest predictors of depression in adulthood.<sup>1</sup> Depression is associated with significant psychosocial co-morbidity, increased health service use, greater disability, negative social outcomes, and suicidality.<sup>1-3,4,5,6,7,8,9</sup> Advancing research on depressive symptoms among adolescents is imperative because adolescence is a decisive period of growth in the lifespan that strongly influences future developmental outcomes.<sup>1-3</sup> As a result of the negative outcomes associated with depression, secondary prevention and early intervention efforts are fundamental aspects to consider when trying to reduce the burden on youth, communities and our health care system in Nova Scotia.

Depression among adolescents is commonly examined in the context of clinical manifestations of the disorder, as expressed by prevalence rates of either Major Depressive Disorders (MDD) or Major Depressive Episodes (MDEs) within a sample of the population. Current epidemiological evidence on clinical rates of depression in Canada is available from the Canadian Community Health Surveys (CCHS). Cycle 3.1 of the CCHS found the twelve month prevalence rate of self-reported MDEs among Nova Scotia adolescent males and females aged 12-19 was 6.8%.<sup>10</sup> Earlier Community Health Surveys have found similar results; Cycle 1.1 reported a prevalence rate of 6.5%<sup>11</sup> and Cycle 1.2 found a rate of 7.6% among Canadian adolescents.<sup>12</sup> In most cases, depression rates for females were between two and three times higher than those of males.<sup>10-13</sup>

When depressive symptoms among adolescents are examined, as opposed to clinical depression, prevalence rates are, as expected, a good deal higher than clinical depression itself. Research conducted in northern Nova Scotia found that approximately 25% of adolescent females in grades ten through twelve exhibited depressive symptoms.<sup>14</sup> In addition, results from the 2004 Health Behaviour of School Aged Children (HBSC) survey indicated that 36% of young females and 25% of young males felt depressed or low at least once a week in the past six months, placing them at risk for depression.<sup>15</sup> Similarly, Santos et al. reported the prevalence of depressive symptoms to be 23% among a sample of south-western United States high school students.<sup>16</sup>

Subclinical depressive symptoms are associated with psychosocial dysfunction and functional impairment.<sup>2</sup> Research conducted at nine high schools in western Oregon indicated that adolescents who obtained elevated scores on the Center for Epidemiological Studies Depression Scale (CES-D), but did not meet diagnostic criteria for depression, demonstrated problematic functioning. These individuals were characterized by elevated levels of current psychopathology and demonstrated an increased risk for experiencing psychopathology in the future, particularly depression and anxiety.<sup>2</sup> Depressive symptoms in adolescence are frequently associated with the development of depression in adulthood therefore; the opinion of researchers who suggest that depressive symptoms are a valid and necessary target of investigation in their own right appears justified.<sup>1-2</sup>

Research has found marked differences between depression in males and females and depressive symptom prevalence rates.<sup>17,18,19,20</sup> For this reason, it is vital to identify explicit risk behaviours associated with depressive symptoms among males and females

so as to inform early screening efforts and secondary prevention programs within a local context. Strong evidence suggests intervention and prevention efforts be implemented at subclinical levels of depression to aid in the prevention of future clinical manifestations of the disorder.<sup>3</sup> Prevention of depressive symptoms among adolescents is possible, as demonstrated by research conducted by Clarke and colleagues.<sup>1</sup> Researchers attempted to prevent depression in a sample of students from three suburban United States high schools. Students were selected for the prevention intervention if they presented with an elevated risk for depressive episodes based on first stage screening techniques that employed the CES-D. In total, 150 consenting subjects were randomized to either a 15-session cognitive group prevention intervention or a usual care control condition. Analyses indicated an advantage for participants in the intervention group, with incidence rates of 14.5% in the intervention group versus 25.7% among those in the control group.<sup>1</sup>

### **1.1 Body Dissatisfaction and Disordered Eating Behaviour**

Body image and self-esteem play a critical role during adolescence as major physical changes occur which affect outward appearance.<sup>1-3,14</sup> It is critical for healthy development that youth adjust to and cope with body changes, but not all youth are capable of accepting and adapting to their physical development. Disconnections between actual physical body shape and ideal body shape are thought to cause weight and body dissatisfaction, particularly among females.<sup>16,21</sup> Body dissatisfaction (BD) and consequent disordered eating behaviour (DEB) (such as dieting or binging) are common among females and are hypothesized to be potential ‘missing links’ which place young females at an increased risk for depressive symptoms when compared to males.<sup>16,22</sup>

Adolescent females may engage in activities meant to reduce or maintain weight so as to increase body satisfaction by becoming more like the ideal promoted to them.<sup>22,23,24,25,26</sup>

Western society upholds a slim body among females and many young females often adopt strategies to emulate this ideal. However, the ideal is often unattainable and the inability to attain the idyllic female body is thought to cause further dissatisfaction with the body.<sup>22</sup> Significant outcomes of BD among adolescent females include dieting, bulimic symptoms and occasionally more severe consequences such as anorexia and bulimia nervosa.<sup>22-23</sup>

Body dissatisfaction and eating behaviour problems are common among females; however, the extent to which male adolescents are affected by these issues is less frequently examined.<sup>16,22</sup> Previous research has assumed that significant differences between male and female adolescents exist, especially around the area of disordered eating and body image issues. Consequently, many studies excluded male samples when looking at these risk behaviours.<sup>16</sup> Adolescent males can experience dissatisfaction with their bodies and may also feel pressure to achieve an ideal perpetuated by society and the media.<sup>16</sup> By comparing risk factors for depressive symptoms between male and female adolescents, it may be determined whether BD and DEB play a role in the increased prevalence of depressive symptoms present among female adolescents.

The Gender Additive Model (GAM) of adolescent depression presents as a theoretical approach aimed at explaining the increased risk for depressive symptoms present among adolescent females as compared with males.<sup>26</sup> The model aims to explain how body and eating related variables (such as body dissatisfaction, pressure to be thin, dieting and bulimic symptoms) produce an increased risk for depressive symptoms among adolescent

females. The ‘additive’ component of this model emphasizes that body and eating related variables interact above and beyond well-established shared risk factors for adolescent depression such as low socio-economic status (SES), lack of peer support and risk taking behaviours.<sup>26</sup> Application of the theoretical concepts of the GAM may further understanding of why depressive symptoms are more prevalent among Nova Scotian adolescent females.

## **1.2 Social Ecological Theory**

To aid in the understanding of the diverse influences on adolescent mental health and the development of depressive symptoms, the contextual underpinnings comprising the social-ecological theory were conceptualized for this study. Social ecological theory divides factors into four systems: macro-, exo-, meso-, and micro. The four systems describe influences as societal, community oriented, institutional, and individual. Individual risk factors are comprised of those that are intrapersonal and interpersonal.<sup>27</sup> This systems approach aims to demonstrate that development is based on continuous interactions within the four systems and that effects can arise from cross-level influences.<sup>27</sup> The current study examined intrapersonal and interpersonal risk factors and behaviours which were contained within the micro- system. By utilizing this systems approach as a loose framework for this research, it becomes evident how intrapersonal factors such as BD and DEB may be influenced by interpersonal factors, such as social support in the school setting, and vice-versa to place young males and females at risk for depressive symptoms.



### **1.3 The Importance of Adolescent Depression to Health Policy in Nova Scotia**

Depression is associated with increased health service use as well as increased psychosocial and behavioural co-morbidities.<sup>3-6</sup> Depressed adolescents are more likely to abuse substances, have behaviour or eating disorders.<sup>7</sup> Additionally, as depressed youth develop into adults, the risk for co-morbid disorders increases greatly.<sup>7</sup> More serious consequences of adolescent depression include suicide, an issue that has been brought to the forefront of mental health awareness in more recent years.<sup>12</sup> To address such issues, the development and improvement of the Nova Scotia mental health system is cited as one of the strategic priorities of the Nova Scotia government.<sup>28</sup> The Nova Scotia “Mental Health Strategy” represents the commitment by the Nova Scotia government to improve mental health and addiction services in the province indicating the importance of mental health to Nova Scotia’s health policy directions.<sup>29</sup>

Subclinical levels of depressive symptoms are common among adolescents,<sup>1,2,4</sup> with females experiencing depressive symptoms more frequently than males, increasing the likelihood of adverse outcomes into adulthood.<sup>6</sup> By examining gender differences in adolescent depressive symptoms within a local context in Nova Scotia, a better understanding of associated risk factors may be developed, leading to important screening implications in addition to the development and improvement of secondary prevention programs for at-risk Nova Scotia adolescents experiencing depressive symptoms.

## **Chapter 2.0 Research Objectives**

This work examined the prevalence of depressive symptoms and independent risk factors that were associated with these symptoms in a population of high school students aged 15 to 19 in industrial Cape Breton, Nova Scotia. There were three major objectives of the proposed research, with the overarching aim of elucidating the role of body dissatisfaction (BD) and disordered eating behaviour (DEB) in depressive symptoms for females when compared to males. It was felt that an enhanced understanding of the gender divergence in depressive symptoms could lead to early screening efforts as well as informing the content of prevention programs and services for at-risk youth. Intrapersonal, interpersonal and other risk factors associated with depressive symptoms were explored through application of theoretical concepts included in the Gender Additive Model (GAM) of adolescent depression,<sup>26</sup> using the social ecological theory as an overarching framework.<sup>27</sup>

The following three objectives were addressed:

### **Objective One**

To determine the prevalence of depressive symptoms among adolescent males and females aged 15-19 from industrial Cape Breton, through use of The Center for Epidemiological Studies Depression Scale (CES-D).

### **Objective Two**

To examine, by gender, associations of intrapersonal, interpersonal and other risk factors with depressive symptoms including BD, DEB, religiosity, school performance, non-

heterosexual sexual orientation, early sexual activity, substance use, social support in the school setting and SES.

**Objective Three**

To explore the role of BD and DEB as differentiating factors in depressive symptoms among male and female adolescents, independent of other risk factors.

## **Chapter 3.0 Body Dissatisfaction, Disordered Eating Behaviour and Depressive Symptoms**

### **3.1 Body Dissatisfaction and Depressive Symptoms**

Adolescent depression is a complex disorder with a number of behaviours and risk factors influencing its outcome.<sup>4</sup> Subclinical levels of depressive symptoms are common among adolescents, leading to further justification for the inclusion of these adolescents in research studies.<sup>1-3</sup> Given that a risk factor for future clinical depression is previous depressive symptoms, further exploration into specific behaviours related to depressive symptoms is clearly warranted.<sup>1</sup>

Body dissatisfaction (BD) is common among adolescent females as pubertal changes deviate the female body from the ideal. Body image research has shown that media and society play a large role in promoting and idealizing the thin ideal, an ideal that is often unattainable for female adolescents.<sup>21-22</sup> Males are also vulnerable to dissatisfaction with their bodies, though it is believed to be in different ways when compared to females. Research has indicated that BD is associated with disordered eating attitudes. Dissatisfaction with the body may also lead to the adoption of more severe disordered eating behaviour.<sup>30</sup>

Risk factors for body dissatisfaction (BD) were examined using data from 531 adolescent males and females in a south-western metropolitan area of the United States. Initial elevations in body mass, negative affect, and perceived pressure to be thin from peers prospectively predicted the increase in BD over the course of a nine month study period. Gender moderated the effect of body mass on BD. In males; BD was highest when they were either underweight or overweight, this finding was not evident in females.<sup>22</sup>

Prospective risk factors for increases in BD among a sample of adolescent males and females from Minnesota were examined. Results showed that predictors of BD were Time 1 BD, SES, friend dieting and teasing from peers, self-esteem and depression.<sup>31</sup> During the early adolescent phase, peer factors were the most influential for BD. Over the five year time period, self-esteem was a prospective risk factor for females but not males. Among males, depression was most influential in the middle adolescent group.<sup>31</sup>

Gender, self-esteem, social support, teasing, and family, friend, and media pressures related to body image and eating-related attitudes and behaviours were examined among male and female adolescents. The study included 177 adolescents with a mean age of 15.8 years from three schools in north-eastern United States. Results indicated significant gender differences on all measures of eating attitudes, body image and self-esteem. As well, females and males differed in terms of individual and social factors. Females reported higher peer support in general, teasing from family about weight, pressure from family and friends to lose weight, and media pressure. Males reported higher self-esteem and more pressure from family and friends to gain muscle than did females whereas, females displayed more high risk eating behaviours than males. The most salient predictor of negative body image and eating attitudes in females was found to be family pressure to lose weight.<sup>30</sup>

Johnson and Wardle used prospective data from adolescent females in north-west England to examine the cross-sectional and longitudinal associations between dietary restraint and eating related outcomes as well as psychological outcomes such as depression and low self-esteem. The strategy included the examination of associations between the two independent variables (dietary restraint and BD) and the two groups of

outcome variables; psychological problems and eating-related problems. The mean age of participants was 14.4 years at baseline and 15.3 years at follow-up. Dietary restraint and BD were strongly correlated variables. Multiple logistic regressions were used to examine the extent to which the effects of restraint were independent of those of BD. Restraint was associated only with more negative attitudes to eating, whereas BD was significantly associated with all the adverse outcomes. These results suggested that BD was a key factor in dietary restraint and psychological outcomes.<sup>32</sup>

Research on BD among adolescents had tended to focus on females, with relationships among males less commonly examined. Negative thoughts and feelings about the body may lead to depressive symptoms. Furthermore, youth may engage in risky behaviours to either control or manipulate the negative thoughts they may be experiencing.<sup>21-23</sup> Youth experiencing BD represent a sub-group of the population who would benefit greatly from indicated secondary prevention programs aiming to reduce both body image issues, and negative emotions that may result from BD.

### **3.2 Disordered Eating Behaviour and Depressive Symptoms**

Disordered eating behaviour (DEB) is a major health concern present in approximately 25% of Canadian females aged 12-19.<sup>24</sup> These behaviours are posited to stem from dissatisfaction with the physical or perceived shape of the body. Research suggests that females who engage in DEB have some level of dissatisfaction with their bodies.<sup>21-22</sup> This assumption seems plausible as it would be rare to an individual who was satisfied with their body engage in disordered eating patterns. Problematic eating behaviours among adolescent females may increase the risk for severe adverse health

outcomes,<sup>10,14,24</sup> thus exemplifying the importance of the identification of this risk behaviour to help inform future prevention strategies and screening efforts.

A recent longitudinal study examined the development pathways of problem eating and associated risk factors among 739 Canadian adolescents. Adolescents who reported some eating problems were at a greater risk of experiencing psychological problems.<sup>33</sup> Eating problems were examined in 116 adolescent females who were followed longitudinally as a part of the Adolescent Study Program. Participants were recruited from private schools in a major north-eastern metropolitan area in the United States. Over 25% of the sample of adolescent females scored above the level that identified a serious eating problem at each of the 3 assessment times. Examination of subsequent patterns over adolescence revealed that patterns of eating problems were associated with early pubertal maturation and a higher body fat, psychological issues, future eating problems, and other adjustment difficulties in adulthood. The results of the study lend to the identification of risk groups of adolescents who would benefit immensely from prevention programs addressing psychological, social and physical correlates of eating problems.<sup>34</sup>

Disturbed eating attitudes and behaviours were examined among females from a large school-based population in Ontario, Canada to determine prevalence and demographic distribution. Current dieting to lose weight was reported by 23% of the participants. In addition, binge eating was reported by 15% of participants, self-induced vomiting by 8% and the use of diet pills by 2%.<sup>24</sup> A more recent study conducted in Nova Scotia found that 16% of young women had engaged in DEB and strong associations existed between DEB and depressive symptoms.<sup>14</sup>

Stice and colleagues explored the relation of media exposure to eating disorder symptoms and tested whether gender-role endorsement, ideal-body stereotype internalization, and body dissatisfaction (BD) mediated the observed effect. Participants included young women from introductory psychology and sociology classes. Measures included media exposure, gender-role endorsement, ideal-body stereotype internalization, body dissatisfaction and eating disorder symptomatology. A direct effect of media exposure on eating disorder symptoms was seen. The variance accounted for was 44% for eating disorder symptoms, 5% for gender-role endorsement, 13% for ideal-body stereotype internalization and 3% for BD. These results support the contention that internalization of socio-cultural ideals mediates the negative effects of the thin ideal and consequent BD due to the inability to obtain the ideal body.<sup>21</sup>

The temporal relations between bulimic pathology, depression and substance abuse were evaluated using prospective data from adolescent females attending four public and four private schools in the south-western United States. Multivariable analyses indicated that depressive symptoms predicted onset of bulimic pathology, but not substance abuse. Bulimic symptoms predicted onset of depression, but not substance abuse, and substance abuse predicted onset of depression but not bulimic pathology.<sup>22</sup>

A recent study examined the reciprocal relationship between depressive and bulimic symptoms over an 8-year period in a community sample of 496 female adolescents. Results indicated that depressive symptoms predicted future increase in bulimic symptoms and bulimic symptoms predicted increases in depressive symptoms, when earlier levels of each symptom for each outcome were controlled for. These results provide evidence that the two disorders contribute in a reciprocal manner to one another



and also suggest that prevention programs targeting one disorder may have effects on the other disorder.<sup>35</sup>

Santos and colleagues studied the co-morbidity between disordered eating and depression among adolescents attending a south-western United States high school. Of major interest was whether disordered eating contributed above and beyond well known risk factors to depressive symptoms. Measures included demographic information, body mass, eating attitudes, self-esteem, body dissatisfaction (BD), and social support. Eating attitudes and depressive symptoms were strongly and positively correlated. In addition, females had significantly higher depressive scores than males. Regression analyses were carried out to predict depressive symptoms from disordered eating attitudes. When the effects of self-esteem, BD and social support were held constant, eating attitudes still contributed a significant amount of variance in the self-reported depressive symptoms among adolescent males and females. Results found disordered eating was prevalent among adolescent males, and models predicting depressive symptoms from body image and disordered eating variables were supported in both males and females.<sup>16</sup>

In sum, BD and DEB are common among young females.<sup>14,16,21-22</sup> Additionally, these behaviours are associated with depressive symptoms and depression.<sup>16</sup> The literature focuses on these behaviours among females, when males can experience dissatisfaction with their bodies and may engage in disordered eating patterns.<sup>16,34-35</sup> One study suggested that problematic eating patterns were just as common among male adolescents and a similar risk pattern for depressive symptoms was apparent.<sup>16</sup> The current study sought to clarify the associations between BD, DEB and depressive symptoms among

male and female adolescents, aiming to provide insight into the increased prevalence of depressive symptoms among adolescent females.

## **Chapter 4.0 Intrapersonal, Interpersonal and Other Risk Factors Associated with Depressive Symptoms**

The following chapter examines intrapersonal and interpersonal risk factors that have a demonstrated association with adolescent depression including religiosity, school performance, non-heterosexual sexual orientation, early sexual activity, substance use, SES and social support. Intrapersonal and interpersonal risk factors encompass the micro-system influences of the social ecological model.<sup>27</sup>

### **4.1 Intrapersonal Risk Factors**

#### **4.1.1 Religiosity**

A number of studies have noted a relationship between adolescent depressive symptoms and religiosity.<sup>36,37,38,39</sup> A total of 134 adolescents from one mid-western United States suburban high school participated in a study that examined the contribution of spirituality above and beyond that of religiosity to depressive symptoms and health risk behaviours. Adolescents with higher levels of spiritual well-being reported fewer depressive symptoms and fewer risk-taking behaviours. Spirituality is thought to provide adolescents with one source of support from which to obtain meaning and purpose, helping to develop resilience and future skills.<sup>36</sup>

The National Longitudinal Study of Adolescent Health (AddHealth) data set was used to identify behaviour and experiences that predicted the commencement of Major Depressive Disorder (MDD) among adolescents. Four factors were identified in the development of MDD; relationships, self-emancipation, low self-worth, and religious activity. Religious activity included three components; how often the adolescent prayed, attended services, and participated in religious youth groups. Results showed a negative

relationship between religious participation and depression risk. Tests of mediation were conducted to determine if the association of MDD with religious activity was mediated through family/interpersonal relations. Results suggested that the association of religious activity to MDD was largely expressed through the influence of said factors on MDD. Strong family and interpersonal relations were most significantly protective against depression at one year follow-up.<sup>39</sup>

The relation between depressive symptoms and three main indicators of religiousness (service attendance, private religious practices, and self-ranked religiousness) were examined among adolescents in a southern New England community. Results indicated that several dimensions of religiousness were associated with lower levels of depressive symptoms such as attendance and positive religious experience.<sup>37</sup>

Baetz and colleagues examined the relation between worship frequency, spiritual values and psychiatric disorders among a representative sample. Odds ratios were calculated for lifetime, one year, and past psychiatric disorders, with worship frequency and spiritual values as predictors. More frequent worship attendance was associated with lower odds of lifetime depression. Higher worship frequency was associated with lower odds of both current and past depression. In addition, higher worship frequency was associated with both current lower alcohol and drug dependence.<sup>38</sup>

#### **4.1.2 School Performance**

Adolescent depressive symptoms can have a considerable negative impact on school performance and can inhibit future educational and occupational endeavours.<sup>40,41</sup> Many of the key components of depression such as loss of interest and difficulty concentrating

may lead to decreased initiative and learning.<sup>13,40-41</sup> Studies have found a relationship between school performance and depressive symptoms. Research conducted by Frojd and colleagues examined the relationship between academic performance and depressive symptoms. Participants included students in grades seven through nine attending school in Pori, a Finnish city. Results indicated that with a lower grade point average (GPA), or if the GPA had declined from the previous term, the more commonly the adolescent was depressed.<sup>40</sup>

Data from the Seattle Social Development Project were utilized to examine the impact of social problems, school failure, and delinquency during adolescence and their role as predictors of MDE in young adulthood. It was hypothesized that adaption problems and associations with later depression may differ for males and females. At age 21, there was a statistical trend toward more depression in females compared to males (22% vs. 17%). As well, researchers found that adolescent school failure predicted later depression among females.<sup>41</sup>

#### **4.1.3 Non-heterosexual Sexual Orientation**

Research on sexual orientation in adolescence is growing. This research is of particular interest as it is thought that gay, lesbian and bi-sexual (GLB) adolescents are exposed to a significant number of stressors in their daily lives that affect mental health.<sup>42</sup> Estimates place the frequency of adolescents who identify as GLB in the range of approximately 3% of the high school population.<sup>42, 43,44,45</sup> Investigation into the factors that play a role in the health outcomes among GLB youth are warranted, as suicide rates and some forms of disordered eating remain high among this population.<sup>42,46</sup> In the past, it has been difficult

to assess the relationship between sexual orientation and outcomes such as depression, as either the survey employed did not ask the question or, if asked, the proportion that self-identified as GLB was very small, thus rendering analysis difficult.<sup>46</sup>

A New Zealand study examined the extent to which GLB youth were at an increased risk for psychiatric disorders and suicidal behaviours. Data were gathered on a birth cohort studied to age 21 years (N= 1265). At 21 years of age, 1007 participants were questioned about their sexual orientation and relationships with same-sex partners since the age of 16 years. Twenty-eight subjects (2.8%) were classified as being of GLB sexual orientation. Results indicated that GLB youth were at an increased risk of major depression (OR= 4.0), substance abuse (OR=1.9) and suicide attempts (OR= 6.2). These findings support recent evidence suggesting that GLB adolescents are at an increased risk for mental health problems.<sup>44</sup>

#### **4.1.4 Early Sexual Activity**

Research indicates that Nova Scotia adolescents engage in sexual activity in the high school setting.<sup>14</sup> Early sexual activity is associated with other individual risk behaviours related to mental health such as problem alcohol and cannabis use.<sup>14</sup> Similarly, decisions regarding sexual activity made while under the influence can lead to negative health outcomes.<sup>39</sup> However, early sexual activity is relatively under-explored in relation to depressive symptoms.

#### 4.1.5 Substance Use

Alcohol use among adolescents is common with over half of all adolescents between the ages of 15 and 18 years in Nova Scotia having tried alcohol.<sup>47</sup> The Canadian Addiction Survey reports that adolescents consume on average, 4.5 drinks per sitting.<sup>48</sup> Moreover, younger Nova Scotians are more likely to report heavy drinking.<sup>47</sup> Results from the CCHS (Cycle 1.1) indicated that alcohol dependence had a positive association with depression for males and females.<sup>11</sup> Similarly, research conducted in Norway found that anxiety and depressive symptoms among adolescent females were related to number of intoxications.<sup>49</sup> In a community sample of over 1500 adolescents, it was found that increased alcohol use was associated with the increased lifetime occurrence of depressive disorders. More than 80% of the adolescents with alcohol abuse or dependence had some other form of psychopathology.<sup>50</sup>

Youth engage in drug use as indicated by a study which reported 23% of northern Nova Scotia males and females in grade twelve had used cannabis more than twenty times throughout their life.<sup>14</sup> The 2007 Nova Scotia Student Drug Use Survey found that 32% of adolescents in grades seven through twelve reported any use of cannabis.<sup>48</sup> Additionally, Lewinsohn and colleagues found that increasing levels of depressive symptoms were associated with increasing levels of substance use. These findings, along with the associations of alcohol use with depressive symptoms, fit the self-medication theory of depression which posits that adolescents engage in patterns of substance use to attempt to ameliorate depressive symptoms.<sup>3</sup>

A study in a mid-western United States city utilized a longitudinal design to assess associations between depressive symptoms and cannabis use among a sample of adolescents. Depressive symptoms predicted later cannabis use only for males. An important finding was that cannabis use did not predict later depressive symptoms for males or females. These findings did not change after controlling for a number of key variables including demographic characteristics, school performance, and substance use at other stages.<sup>51</sup>

Using prospective data from adolescent females in the south-western United States, Stice et al. reported results on the relations between bulimic pathology, depression and substance abuse, finding that 6.5% of females met criteria for substance abuse and substance abuse predicted onset of depression but not bulimic pathology.<sup>52</sup>

Substance use is common among adolescence as youth progress through a time of experimentation.<sup>3</sup> However, many youth are not aware of the psychological and physiological consequences of substance abuse. Efforts must be undertaken to reduce the use of alcohol and other substances among youth to aid in the prevention of serious health consequences, including the risk for depression.

## **4.2 Interpersonal Risk Factors**

### **4.2.1 Social Support in the School Setting**

Peer relationships are thought to play a role in the development of adolescent depression with deficits and lack of quality relationships thought to place the adolescent at risk for depression.<sup>53</sup> Social support can be derived from peer relationships which are often developed and maintained in the school setting, as adolescents spend a significant portion



of their time in the academic location. Support also comes from the family unit. Lower family support is related to depression among adolescents.<sup>53,54,55</sup> In addition, the quality of the relationship between adolescents and their parents has been found to predict a diverse array of youth health and behavioural outcomes.<sup>53</sup>

Potential risk factors for depressive disorders among young Canadians (aged 15-24) were compared to those of older age groups and the role of both individual and contextual factors in the continuation of depression were examined. The combination of networking, social support, and stress strongly distinguished between adolescent cases of long-term depression and non-cases. A weaker feeling of neighbourhood belonging was related to new cases of depression. These results suggest possible targets for preventative measures existing in social influences of youth.<sup>56</sup>

The associations between parental support, peer support and depressive symptoms among adolescents in a south-western city in the United States were examined. Deficits in parental support, but not peer support, were found to predict future increases in depressive symptoms and onset of major depression. In addition, elevated depressive symptoms at Time 1 predicted decreases in perceived peer support at Time 2.<sup>55</sup>

Data from the 1997 US National Longitudinal Survey of Youth were utilized to examine the influence of the parent-adolescent relationship on future adolescent mental well-being and delinquency. The structural relationships between positive parenting, delinquency and mental well-being were found to be consistent for both male and female adolescents and these associations occurred over and above the effects of other background factors.

Findings highlight the continued importance of effective parenting to ensure optimal mental health among youth.<sup>53</sup>

A longitudinal study involving 354 participants from north-eastern United States was conducted to examine the correlates and continuation of adolescent depression. The data collected during childhood and adolescence were linked to diagnoses of major depression at ages 18-26. During the transition to adulthood, 82 participants (23.2%) experienced major depression. Multi-variable analysis indicated that family violence, family composition, internalizing problems, and low family unity were the most significant predictors of depression. These results underline the importance of familial and behavioural-emotional predictors of depression that may serve as points of focus for future research endeavours.<sup>54</sup>

Data from a sample of adolescents living in upstate New York were utilized to examine the effects of peer and parental support on adolescent depression.<sup>57</sup> It was found that as an adolescent got older, anticipated peer support was increasingly related to the adolescent's well-being, particularly for preventing the exacerbation of their depressive symptoms. Support from parents and peers were seen to be important predictors of future depressive symptoms and MDD.

Familial factors are central to the development of a healthy adolescent; low support from the family is associated with risk for depression in addition to other negative health outcomes.<sup>56-57</sup> Peer influences and social support become increasingly important as adolescents progress through middle and high school. Although inconsistencies are present in the literature regarding the role of peer and parental support, both variables

play a specific role in the development and exacerbation of depressive symptoms among youth.<sup>54-57</sup> The current study examined social support in the school setting by assessing whether adolescents felt that others at their school were helpful or not. Perceived helpfulness of others provided insight into whether the adolescent felt they were receiving support in the school setting.

### **4.3 Other Risk Factors**

#### **4.3.1 Socio-economic Status**

Studies have indicated that lower socio-economic position and depressive symptoms are associated.<sup>9-10</sup> A 2007 summary report on depression in Nova Scotia concluded that depressive symptoms were more common among those in lower income groups. Additionally, it was found that low income individuals were at an increased risk for depression.<sup>10</sup>

The literature reveals a number of risk factors associated with adolescent depression. There is complexity involved in how risk factors interact with one another given the influence of other factors. Conceptualization of risk factors in a social ecological framework can aid in the understanding of these complex interactions to improve early screening efforts and help to direct the content of secondary prevention programs aiming to reduce depressive symptoms and future depression among male and female adolescents.

## **Chapter 5.0 Prevention of Adolescent Depressive Symptoms**

### **5.1 Depressive Symptoms versus Clinical Depression**

Depression can be viewed from both clinical and subclinical perspectives. Researchers come from two theoretically different standpoints with one side promoting the continuity theory and the other; the categorical hypothesis.<sup>3</sup> The continuity theory argues that adolescent depression exists on a continuum, rather than as a distinct categorical disorder (as in the categorical hypothesis).<sup>3</sup> In addition, the continuity theory suggests that depressive symptoms differ in degree rather than kind.<sup>1-3</sup> That is, the characteristics of depression are still experienced by adolescents with subclinical depressive symptoms; they just differ in the degree of severity.<sup>3</sup>

Drawing on the viewpoint of the continuity theory, clinical implications of sub-threshold depressive symptoms were examined among three samples (adults, older adults and adolescents). The adolescent sample included three cohorts drawn from nine senior high schools in urban and rural western Oregon.<sup>3</sup> Multiple indices of dysfunction were examined as a function of depressive symptoms in the three samples. Results indicated that increasing levels of depressive symptoms were associated with increasing levels of dysfunction, MDD and substance use. The results suggest that clinical depression was not categorically distinct from other degrees and patterns of depressive symptoms. In conclusion, sub-threshold depressive symptoms were found to predict future MDD.<sup>3</sup>

Gotlib and associates examined clinical and psychosocial correlates that would differentiate true-positive depressed adolescents from adolescents labelled as false-positive. Psychosocial functioning was compared among adolescents defined as true-

positive, false-positive and true-negative based on CES-D scores and diagnostic status.<sup>2</sup> Both true-positive and false-positive participants obtained elevated scores on the CES-D and the two groups did not differ on psychosocial functioning. The authors conclude by stating that investigators may benefit from examining the psychosocial functioning of adolescents labelled as false-positive to aid in the prevention of future psychopathology.<sup>2</sup>

## **5.2 Prevention Programs Targeting Depressive Symptoms**

Prevention programs targeting depressive symptoms among adolescents can be categorized as universal, selective and indicated. Universal programs are administered to all members of a particular population. Selective prevention programs are targeted to subgroups of the population who are determined to be at risk. This may include a program offered to individuals residing in a low-income area. Indicated preventive interventions are administered to individuals who manifest subclinical symptoms of a disorder such as elevated depressive scores on the CES-D.<sup>58</sup>

The most effective prevention programs implemented to date have been cognitive-behavioural.<sup>58</sup> These programs teach cognitive strategies such as identifying and dealing with negative thoughts and problem-solving skills. In addition, many of the prevention programs teach methods and skills for dealing with stress.<sup>1,58,59,60,61</sup> Unlike pharmacology, cognitive behaviour therapies teach a set of skills that can be applied long after the completion of therapy. The majority of depressed individuals experience multiple episodes and therefore the capacity of an intervention to address current depressive symptoms is equalled in importance by its ability to prevent future depressive episodes.<sup>6</sup>

A group cognitive intervention was implemented with the goal of preventing depressive episodes among students from 3 suburban United States high schools who presented with an elevated risk for depressive episodes based on techniques that employed the CES-D. This program would be classified as indicated. In total, 150 consenting subjects were randomized to either a 15-session cognitive group prevention intervention or a usual care control condition. Subjects were assessed at 6 and 12 month follow-up points. There was an advantage for the prevention program, with affective disorder total incidence rates of 14.5% for the active intervention versus 25.7% for the control condition. The authors concluded that depressive episodes can be successfully prevented among adolescents who exhibit an elevated future risk for depressive episodes.<sup>1</sup>

A cognitive-behavioural prevention program was administered to university students who were at-risk for depression. Randomization occurred to either an 8-week prevention workshop or a control group. Participants were followed for 3 years and the preventative effects of the workshop on depression and anxiety were reported. The workshop group showed fewer episodes of anxiety and there was a trend toward fewer MDEs. Additionally, the intervention group had significantly fewer depressive symptoms as measured by self-report. Moreover, the intervention group had significant improvements in cognitive behaviours. The authors concluded by stating that if depressive episodes could be prevented at early stages in life, there may be long-lasting benefits on the mental health of adolescents.<sup>61</sup>

Researchers developed a cognitive-behavioural intervention that targeted body dissatisfaction (BD), a proposed risk factor for both bulimic and depressive pathology. The focus was on bulimic and depressive symptoms rather than diagnoses because

authors hypothesized sub-diagnostic levels of depressive symptoms could be associated with distress and impairment. Participants included 74 late adolescent females from local colleges and universities in the United States, ranging in age from 17-20 years. The intervention was developed from a previously successful program. Researchers found that the intervention reduced depressive symptoms, bulimic pathology, BD and negative affect. The effects of the prevention program persisted through 3-month follow up, but most effects did not exist by 6-month follow up. Many of the effects appeared to be mediated by BD. Results indicated that interventions would benefit from focusing on preventing future BD symptoms, in addition to current BD symptoms, to reduce the likelihood of bulimic and depressive pathology.<sup>59</sup> This study presents as a secondary prevention program which is brief in nature and thus lends itself to dissemination.

A recent meta-analytic review summarized the effects of depression prevention programs for youth and identified research design features associated with larger effect. In total, the authors identified 47 trials that evaluated 32 prevention programs, producing 60 intervention effect sizes. The average effect of the prevention programs for depressive symptoms from pre- to-post treatment was small ( $r=.15$ ). However, of the 32 prevention programs evaluated, 13 programs (41%) produced significant reductions in depressive symptoms and 4 (13%) produced significant reductions in risk for future depressive disorder onset when compared to control groups. The specific design features of depression prevention programs producing larger effects included those programs that targeted high-risk individuals (selective vs. universal interventions), females and older adolescents. In addition, larger effects emerged for programs with a shorter duration and homework assignments, as well as those programs that were delivered by a professional

interventionist rather than a classroom teacher.<sup>58</sup> These findings highlight the potential benefits of focusing on selective (at risk sub-groups of the population) and indicated (high-risk individuals) programs for the secondary prevention of depressive symptoms among adolescents.

Depression can be successfully prevented among adolescents who exhibit elevated levels of depressive symptoms.<sup>1,58</sup> By using cognitive behavioural strategies that teach youth how to adapt to changes in their lives and deal with everyday stress, there may be the ability to reduce the occurrence of negative thoughts, feelings and poor body image. Research suggests that a greater effect of prevention programs occurs when the programs are either selective or indicated, meaning the programs are directed toward sub-groups of the population who are deemed at-risk, or individuals who are high-risk. Interventions aiming to reduce the risk of both depression and eating problems may also be successful, as demonstrated by Bearman and colleagues.<sup>59</sup>



## **Chapter 6.0 Gender Differences in Depressive Symptoms and the Gender Additive Model**

### **6.1 Gender Differences in Depressive Symptoms**

Research has demonstrated profound differences in rates of clinical depression between adolescent males and females.<sup>11,13,18,20</sup> In most cases, prevalence rates for adolescent females are double or triple those of males.<sup>10,11,13,18,20</sup> It is thought that the divergence of rates becomes apparent approximately in middle adolescence; all through childhood and up until 14-15 years of age, depression rates between males and females are relatively similar.<sup>6-7</sup> The focus for the current research was to provide data and analyses on the age group 15-19, as it has been demonstrated that this is when the difference becomes prominent.

Reports from the CCHS (Cycle 1.1) were used to determine the correlates of adolescent depression. The 12-month prevalence rate of depression among adolescent females was 9.8%, while for males the rate was 3.4%. Alcohol dependence had a positive association with depression for both females and males. Even after controlling for many variables, adolescent females were still more likely to be depressed. Researchers were unable to account for the gender differences in the odds of being depressed using the variables in the study alone.<sup>11</sup>

Using data from the CCHS (Cycle 1.2) Mental Health and Well-Being survey, results showed that depressive disorders were more common among females, those aged 20-24 years, individuals under extreme stress and those who were no longer in school.<sup>62</sup> Similarly, Patten and colleagues describe the epidemiology of major depression in Canada. It was found that depression was more common among females and those in

younger age categories. The differences noted between the sexes became smaller with advancing age.<sup>20</sup>

Prevalence and co-morbidity of depression with other disorders were assessed in a randomly selected sample of high school students in nine high schools in west-central Oregon, United States. Researchers found that 10% of the students met criteria for a current depressive disorder and more than 33% had experienced a disorder over their lifetime. Females at all age levels had significantly higher rates of depression and eating disorders when compared to male subjects, while males had a higher rate of disruptive behaviour disorders.<sup>13</sup>

Ge et al. examined the role of both pubertal and social transitions in the materialization of gender differences in depressive symptoms during adolescence using data from the Iowa Youth and Families Project. This study provided convincing evidence on the emergence of gender differences in depressive symptoms in adolescence because data was collected for all six years of the secondary school period. Findings indicated that gender differences in depressive symptoms appeared during 8<sup>th</sup> grade; early-maturing girls represented the group with the highest rate of depressive symptoms; depressive symptoms measured in the 7<sup>th</sup> grade predicted levels in other years; and that stressful life events were associated with increased depressive symptoms.<sup>18</sup>

The difference in prevalence rates of depressive symptoms among male and female adolescents is significant.<sup>13</sup> Furthermore, epidemiological evidence and risk factors examined to this point are unable to account for the difference.<sup>26</sup> In more recent years, research on body image and eating behaviours have been able to shed some light on this

issue. More specifically, some researchers think that body image and eating problems are behavioural risk factors for depression specific to females that then increase the risk for developing depression.<sup>26,63</sup> It has been proposed that this is why the divergence in prevalence rates is apparent between genders.<sup>26</sup>

## **6.2 Gender Additive Model**

Using data from a longitudinal community study, Stice and Bearman tested whether body-image and eating disturbances might to some extent clarify the increased prevalence of depression observed among adolescent females.<sup>26</sup> Participants included 231 female students from two northern California private high schools, with a mean age of 14.9 years. Measures included body mass, perceived pressure to be thin, thin-ideal internalization, body dissatisfaction, dieting, bulimic symptoms, social support and depressive symptoms. Initial pressure to be thin, thin-ideal internalization, body dissatisfaction, dieting and bulimic symptoms predicted later increases in depressive symptoms. Additionally, there was prospective support for each of the hypothesized mediational relations, which in turn linked these risk factors to increases in depressive symptoms among adolescent females. The noted effects remained significant when other established gender non-specific risk factors for depressive symptoms were controlled for. Results indicated that body-image and eating disturbances may contribute to the increased prevalence of depressive symptoms among adolescent females. This study represented only a partial test of the GAM, as risk factors for increased depression were only examined among females. Future research would require the relationships be assessed in both male and female adolescents.<sup>63</sup>

In order to test the hypotheses presented by results from the longitudinal study in 2001, results were extended through construction of separate models predicting depressive symptoms for adolescent males and females.<sup>63</sup> The GAM of adolescent depression proposes that there are shared risk factors for depression among males and females (such as deficits in social support), but additional factors (body image and eating related variables) thought to be present mostly among females, may be able to explain the increased prevalence of depressive symptoms among females. Figure 1 represents the hypothesized mediational linkages between the risk factors that produce the outcome of depressive symptoms.

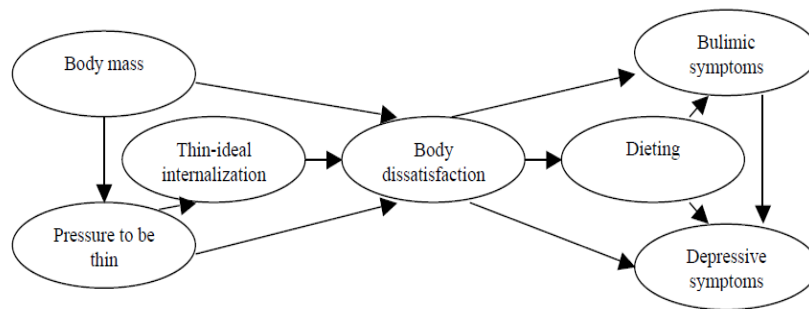


Figure 1: Mediational Components of the Gender Additive Model of Depression<sup>26</sup>

To test the GAM, 247 adolescent females and 181 adolescent males from four private and four public schools in south-western United States were studied over a twelve month period. The Time 1 risk factors which were significant predictors of depression onset included; negative affect, deficits in parental and social support, externalizing behaviours, BD, dietary restraint and eating pathology. Results suggested that BD and dietary restraint predicted depression for females, but not for males. Body dissatisfaction continued to be a strong predictor of depression among females even when other risk

factors were included in the model. Bulimic pathology predicted future depression for both males and females, in contrast to initial hypotheses. Findings indicated some support for the gender additive model, although researchers suggest a revised version of the GAM in future studies in order to reflect the idea that BD was the central risk factor in the theoretical model.<sup>63</sup> Many of gender non-specific risk factors examined did not predict depression differentially between the genders. This research may provide insight into gender differences and similarities in relation to the prevalence of depression and provide direction for identifying high risk individuals and developing targeted prevention programs.

## **Chapter 7.0 Methods**

### **7.1 Funding and Ethics**

Funding for the proposed project was provided by The Nova Scotia Health Research Foundation's Student Research Award program. Ethics approval was received from the Dalhousie University Health Sciences Research Ethics Board.

### **7.2 Data and Subjects**

This study used secondary data gathered for the Canadian Institutes of Health Research funded research project "School-Based Health Centres in Cape Breton: Gathering Evidence to Inform Policy and Practice." The project was carried out to determine use of school-based health centres in schools in Cape Breton Regional Municipality. The proportion of females and males who took part in the study's school based self-completion survey was approximately equal, representing 49% and 51% of students respectively. The mean age of male students was 16.8 years and for females; 16.7 years.<sup>64</sup>

### **7.3 Sample Size Calculations**

Sample size and power calculations were calculated for a cross-sectional survey using a least detectable odds ratio approach with the StatCalc function of the EpiInfo program.<sup>65</sup> The prevalence of DEB among female adolescents was obtained from the literature<sup>24</sup> and the least detectable OR was calculated with 80% power and a significance level of 0.05. The ratio of non-DEB to DEB groups was estimated to be 3:1,<sup>24</sup> while the expected frequency of depressive symptoms in the non-DEB group was estimated at 24%.<sup>14</sup> The frequency of depressive symptoms among the DEB group was estimated to be 36%, a

more conservative estimate compared to the available literature.<sup>14</sup> As an example to illustrate the interpretation, the least detectable OR for depressive symptoms between DEB groups was 1.78. This value indicates that an OR of 1.78 is the smallest effect that (if true) has an 80% chance of producing an estimate that is statistically significant at the 0.05 level of significance. In other words, with these chosen levels of significance and power, there must be at least an OR of 1.78 existing in the population, in order to obtain a significant estimate in this fixed sample size (n=636).<sup>65</sup>

#### **7.4 Demographic Information**

According to the Statistics Canada Community Profiles, the population of Cape Breton Regional Municipality was 102,250 in 2006. At the time of the census, there were a total of 7155 males and females aged 15-19 residing in the area. The median income for all census families was \$49,337 in 2005, \$6075 lower than the Nova Scotia median income.<sup>66</sup>

#### **7.5 Data Collection**

In May of 2006, a self-report survey was administered to students in grades ten through twelve attending three Cape Breton high schools. The survey occurred during regular class times and was administered by teachers who participated in training on survey administration provided by the research team. Informed consent was obtained from students. The overall response rate for this self-completion survey was 92% of registered students present in class the day of the survey representing 1629 respondents.<sup>65</sup>

## **7.6 Data Measurement**

### **7.6.1 Dependent Variable**

The dependent variable of interest for the study was depressive symptoms. Depressive symptoms were measured using the CES-D scale, a short self-report scale designed to measure depressive symptoms in the general population. The CES-D has high internal consistency, acceptable test-retest abilities, as well as excellent concurrent and construct validity.<sup>67</sup> The CES-D scale consists of 20 questions asking respondents to recall the presence and severity of depressive symptoms over the past week.<sup>67</sup> Respondents rate symptoms on a 4 point scale (0= rarely or none of the time; 1= some or little of the time; 2= occasionally or a moderate amount of time; 3= most or all of the time), and scores are yielded from 0-60.<sup>68</sup> A cut-off point of a score on the CES-D  $\geq 24$  for females and  $\geq 22$  for males was used to indicate moderate to severe depressive symptoms.<sup>69</sup> These cut-points are based on research conducted by Lewinsohn and colleagues.<sup>69</sup> The CES-D scale is acceptable and reliable in adolescents and is helpful when studying the relationship between depressive symptoms and other variables.<sup>68</sup>

### **7.6.2 Independent Variables**

Independent variables of interest encompass intrapersonal, interpersonal and other risk factors that have been shown to be associated with depressive symptoms. Variables developed and assessed included body dissatisfaction (BD), disordered eating behaviour (DEB), religiosity, school performance, non-heterosexual sexual orientation, early sexual activity, substance use, social support in the school setting and SES. Eating disorder and body weight questions, as well as questions related to substance use behaviours were



taken from the United States Youth Risk Behaviour Surveillance Survey, which has established reliability.<sup>70</sup> Socio-economic variables and individual level variables (e.g., school performance and religiosity) are categorical survey questions which have established test-retest reliability with Cohen's Kappa scores of at least 0.50.<sup>65</sup>

#### **7.6.2.1 Intrapersonal Variables**

Body dissatisfaction (BD) was treated as a dichotomous variable and measured using responses to the following question: "How do you describe your weight?" Participants were asked to select one of five responses from very underweight to very overweight.<sup>65</sup> Selection of one of the four categories besides "about the right weight" was considered indicative of BD.

Disordered eating behaviour (DEB) was treated as a dichotomous variable and defined by the answers to the following three questions: (1) "During the past 30 days, did you go without eating for 24 hours or more to lose weight or keep from gaining weight?" Possible answers were yes vs. no. (2) "In the past 30 days, did you take any diet pills, powders or liquids without a doctor's advice to lose weight or keep from gaining weight?" Possible answers were yes vs. no (3) "During the past 30 days did you vomit or take laxatives to lose weight or keep from gaining weight?" Possible answers were yes vs. no.<sup>65</sup> An answer of "yes" to one or more of the three above stated questions indicated that the respondent was engaging in DEB, whereas selection of the response "no" indicated that the respondent was not engaging in DEB.

Religiosity was treated as a dichotomous variable and based on the response to the following question: (1) "How important would you say religion is to you? Is it:"

Participants could choose one of four categories (not important at all to very important).<sup>65</sup> Religiosity was dichotomized into low importance and high importance with the selection of categories 1 or 2 (out of a possible 4) being indicative of low importance of religiosity in the adolescents' life.

School performance was treated as a dichotomous variable and based on the response to the question "What was your overall average mark on your last report card?" Participants could choose one of six categories (less than 50 to 90-100).<sup>65</sup> This variable was dichotomized to below 70 and 70 plus, with below 70 being indicative of poor academic performance.

Non-heterosexual sexual orientation was utilized as a dichotomous variable and based on the response to the question "Which of the following best describes your feelings?" Participants could choose one of six categories (100% heterosexual to not sure).<sup>65</sup> This variable was dichotomized into heterosexual and non-heterosexual. Selection of one of four non-heterosexual categories was indicative of non-heterosexual sexual orientation.

Early sexual activity was based on the response to the following question "I had vaginal sex for the first time when I was \_\_\_\_ years old" Participants were asked to fill in the appropriate number or select not applicable.<sup>65</sup> Early sexual activity was treated as a dichotomous variable, selection of younger than 15 years of age was considered an indication of early sexual activity.

Substance use encompassed two risk behaviours including problem alcohol and cannabis use. Responses from the two survey questions were combined to create this variable. Problem alcohol use was assessed as a dichotomous variable and defined based on the

answer to the question “During the past 30 days, on how many days did you have 5 or more drinks of alcohol in a row, that is, within a couple of hours?” Participants could choose one of seven categories (0 days to 20 or more days).<sup>65</sup> Selection of 3 days or more was considered an indication of regular, rather than experimental alcohol use in the past 30 days. Problem cannabis use was used as a dichotomous variable and based on the answer to the question “During the past 30 days, how many times did you use marijuana?” Participants could choose one of six categories (0 times to 40 or more times).<sup>65</sup> Selection of 3 or more times was considered an indication of regular cannabis use.

#### **7.6.2.2 Interpersonal Variable**

Social support in the school setting was constructed based on the responses to the following question: (1) “Please check which of the following two statements you agree with: Most of the people I go to school with can be trusted OR You can’t be too careful of the people I go to school with.” Selection of the second statement was indicative of low social support in the school setting.<sup>65</sup> Perceived trust in the social environment may indicate a certain level of support and encouragement from that environment.<sup>27</sup>

#### **7.6.2.3 Other Variable**

Socio-economic status (SES) was treated as a dichotomous variable and perception of family wealth was used as a proxy for SES. SES was based on the response to the following question: “How well off do you think your family is compared to other teens in your school?” Participants could choose one of 5 categories (very well off to not at all

well off).<sup>65</sup> The variable was dichotomized into low (average, not very well off, not at all well off) versus high (quite well off or very well off) perception of family wealth.

## **7.7 Data Analysis**

Initially, the data were reviewed and cleaned and individuals with missing values for any of the independent variables of interest were excluded. For the dependent variable of interest, the mean value of the Center for Epidemiological Studies Depression (CES-D) score was generated and used for the 18 missing values for the CES-D variable measuring depressive symptoms.

To describe the study sample accurately, frequencies were run on intrapersonal, interpersonal and other risk factors and depressive symptoms. Cross-tabulations were conducted by gender to examine the associations between independent risk factors and depressive symptoms. Multiple logistic regression models were run to examine associations between BD, DEB and adolescent depressive symptoms separately for males and females when all other variables in the model were statistically controlled for. Odds ratios for the multiple logistic regressions were obtained. Age and site where the survey took place were statistically controlled for.

Below is a description of the analysis approach used in answering each research objective. The following three objectives were addressed:

### **Objective 1**

The first objective was to determine the prevalence of depressive symptoms among adolescent males and females attending high school in industrial Cape Breton, through use of The Center for Epidemiological Studies- Depression Scale (CES-D).

To accomplish objective one descriptive analysis, including frequencies, were conducted on the data set to determine the prevalence of depressive symptoms, as well as the frequency of independent risk factors associated with depressive symptoms. The descriptive analysis provided evidence on the magnitude of depressive symptoms in this population, as well as the frequency of other critical risk factors among Cape Breton youth.

## **Objective 2**

The second objective was to examine by gender, the associations of intrapersonal, interpersonal and other risk factors with depressive symptoms including BD, DEB, religiosity, school performance, non-heterosexual sexual orientation, early sexual activity, substance use, social support in the school setting and SES.

To accomplish objective two, chi-square tests of association were used to examine associations between the dependent variable, depressive symptoms, and the above mentioned independent risk factors.

Additionally, at this point an assessment of possible interaction effects and confounding between variables was carried out to allow for the inclusion of interaction terms in multiple logistic regression procedures if necessary. To assess effect modification, both crude and stratum specific (by socio-economic status) odds ratios were calculated through cross-tabulations and compared.

### **Objective 3**

The third objective was to explore the role of BD and DEB as differentiating factors in depressive symptoms among male and female adolescents, independent of other risk factors.

To accomplish objective three, adjusted associations of the independent variables were assessed using multi-variable logistic regression procedures. Three separate models were constructed for each gender. For the first model, baseline variables (confounding variables) were used to construct the best fit model that had the ability to predict depressive symptoms. In the second model, BD was entered to see the ability to explain any variance in depressive symptoms. In the final model, DEB was entered to see the ability to explain variance present in depressive symptoms. It was anticipated that DEB would explain a large amount of the variance present in depressive symptoms among young females. For males, a similar trend was not expected. All statistical analyses were conducted on the data set using Stata (release 10) statistical software.<sup>71</sup>

## Chapter 8.0 Results

Overall, there were 718 males and 713 females over the age of fourteen and younger than twenty, giving roughly equal proportions by gender. The prevalence of depressive symptoms and independent risk factors for male and female adolescents were calculated (see Table 1 for details). Individuals with missing values for any of the independent variables of interest were excluded.

Among males, 20.6% were found to have depressive symptoms based on a positive screening on the Center for Epidemiological Studies Depression Scale (CES-D). Approximately 42% of males reported body dissatisfaction (BD) and disordered eating behaviour (DEB) was present among 9.6% of males. In addition, 40% of males had low social support in the school setting. Almost 55% had low religious importance, while 46% engaged in regular substance use (either alcohol or cannabis use or both). In comparison, 32.4% of females surveyed reported depressive symptoms based on a positive screening on the CES-D. Of females, 44.5% reported BD, and DEB was common with 18.2% engaging in these behaviours. Similar to male participants, 44% of females had low social support in the school setting, while approximately 35% were engaging in substance use on a regular basis.

To test for differences between male and female participants, chi-square tests of significance were performed. Test results indicated that statistically significant differences ( $p < 0.001$ ) existed between males and females for depressive symptoms, DEB, low religious importance, school performance and substance use.

The associations between depressive symptoms (the dependent variable) intrapersonal, interpersonal and other risk factors (independent variables) were examined for males (results can be found in Table 2). Males with BD were significantly more likely to report depressive symptoms (27.3% vs. 15.7%, p-value <0.001). Males with DEB were significantly more likely to report depressive symptoms than those without DEB (44.9% vs. 18.0%, p-value <0.001).

Males with less than average socio-economic status (SES) were significantly more likely to exhibit depressive symptoms than males with average and above SES (38.1% vs. 18.9%, p-value <0.001). Additionally, males with low social support in the school setting were statistically significantly more likely to report depressive symptoms (30.2% vs. 14.3%, p-value <0.001). Males with non-heterosexual sexual orientation were more likely to be at risk for depressive symptoms than students who self-reported as heterosexual (42.3% vs. 19.8%, p-value 0.005).

The association between depressive symptoms and independent risk factors were calculated for female participants (see Table 3 for results). Females who reported BD were significantly more likely to have depressive symptoms (39.1% vs. 27.0%, p-value <0.001). Females who engaged in DEB were statistically significantly more likely to report depressive symptoms (60.8% vs. 26.1%, p-value <0.001) than those who had not engaged in DEB.

Females who had low social support in the school setting were more likely to report depressive symptoms (41.7% vs. 25.1%, p-value <0.001), as well as those who reported poor school performance (49.3% vs. 28.0%, p-value, 0.010). Furthermore, females with



non-heterosexual sexual orientation were more likely to report depressive symptoms (60.6 % vs. 31.0%, p-value <0.001).

### **8.1 Assessment of Confounding and Effect Modification**

To assess the possibility of confounding and effect modification among variables, the stratum specific ORs were calculated by levels of SES. All variables were considered to be potential confounders; however, SES was selected based on its association with a number of risk factors among adolescents. The two categories of SES were constructed from the proxy variable perception of family wealth. Effect modification was evaluated by comparing the crude odds ratio to the stratum specific odds ratios for the two levels of SES. Based on methods outlined by Oleckno, effect modification was present if the either of the stratum specific odds ratios differed from the crude OR by at least double.<sup>72</sup> Confounding was assessed by comparing the stratum specific odds ratios with the crude odds ratio. Confounding was not likely to be present if at least one of the stratum specific odds ratios were similar to the crude odds ratio.<sup>72</sup>

The crude and stratum specific odds ratio (OR) by SES among males for the association between depressive symptoms and independent risk factors were calculated (see Table 4 for results). Confounding was assessed and found not likely to be present.<sup>72</sup> Effect modification was thought to be likely for four variables; low religiosity, low social support in the school setting, school performance and body dissatisfaction (BD).<sup>72</sup> However, when the interaction terms were constructed and assessed in goodness of fit tests, the interaction terms did not improve model fit (not shown in table 4).

The crude and stratum specific odds ratio (OR) by SES for the association between depressive symptoms and independent risk factors were examined among females (results in Table 5). The data indicated that effect modification was not present. Confounding was assessed and found not likely to be present in this sample (not shown in table 5).<sup>72</sup> However, this could not be determined for two variables; non-heterosexual sexual orientation and early sex (<15 years old), as there was an insufficient cell size in the SES below average category.

## **8.2 Multiple Logistic Regressions**

Multiple logistic regression procedures were conducted separately for males and females with depressive symptoms as the outcome variable and intrapersonal, interpersonal and other risk factors as the independent predictor variables. The relationship between predictor variables BD, DEB and the outcome of depressive symptoms was of main interest, with the comparison between males and females the emphasis. Model building was approached using a block perspective, in which independent variables were entered into the model and the addition of the variables to the conceptual model were evaluated. Model one included all risk factors but BD and DEB. In model 2, BD was entered into modelling procedures and in model 3, BD and DEB were included resulting in nine independent variables for the full model for each gender. In each model, age of the survey participant and school site where the survey took place were statistically controlled for.

The first model for males included all independent variables but BD and DEB (results in Table 6). Three risk factors had significant positive relationships with depressive

symptoms including SES less than average, (OR 2.12, 95%CI 1.20-3.75) low social support in the school setting (OR 2.30 95%CI 1.57-3.35) and non-heterosexual sexual orientation (OR 2.59, 95%CI 1.12-5.98).

The second logistic regression procedure for males involved the addition of BD as an independent predictor variable (see table 7 for results). BD had a significant positive relationship with depressive symptoms (OR 1.89, 95%CI 1.28-2.77). Additionally, SES less than average (OR 1.93, 95%CI 1.09-3.44), low social support in the school setting (OR 2.22, 95%CI 1.52-3.26) and non-heterosexual sexual orientation (OR 2.42, 95%CI 1.04-5.64) continued to have significant positive relationships with depressive symptoms.

For the full model in males, BD and DEB were added as independent predictor variables, resulting in a total of nine independent variables (refer to Table 8 for results). DEB was found to have a statistically significant association with depressive symptoms (OR 3.35, 95%CI 1.92-5.86). BD remained statistically significant in the final model (OR 1.72, 95%CI 1.16-2.54). This indicated that BD and DEB may have acted independently on the outcome of depressive symptoms in males. Risk factors SES less than average (OR 2.00, 95%CI 1.11-3.59), and low social support in the school setting (OR 2.33, 95%CI 1.58-3.45) remained statistically significant. Non-heterosexual sexual orientation lost significance in the final model; however, this may have been a result of the low frequency of males who self-identified as non-heterosexual in the survey.

The first multiple logistic regression procedure for females included all variables but BD and DEB (see Table 9 for details). Two of the seven variables in the first model had a statistically significant relationship with depressive symptoms; low social support in the

school setting (OR 1.98, 95%CI 1.42-2.76) and poor school performance (OR 2.33, 95%CI 1.57-3.46). Furthermore, non-heterosexual sexual orientation showed a trend toward statistical significance (OR 2.14, 95%CI 1.01-4.56).

For the second multiple logistic regression procedure in females, BD was added as an independent predictor to modelling procedures (results shown in Table 10). BD had a statistically significant positive relationship with risk for depressive symptoms (OR 1.62, 95%CI 1.16-2.26). Low social support in the school setting (OR 1.94, 95%CI 1.39-2.71) and poor school performance (OR 2.28, 95%CI 1.53-3.39) remained statistically significant. Non-heterosexual sexual orientation showed a trend toward statistical significance (OR 2.04, 95%CI 0.95-4.38).

For the full model in females, BD and DEB were added to multiple logistic regression procedures (see results in Table 11). A statistically significant positive relationship was found for DEB (OR 3.40, 95%CI 2.23-5.19) among females; however, BD lost significance when DEB was added to the model (OR 1.39, 95%CI 0.98-1.96). These results indicate a possible relationship between independent risk factors DEB and BD in female adolescents, a pattern that was not evident among males. In fact, these results suggest possible mediation by the DEB variable on the association between BD and depressive symptoms among females. Risk factors low social support in the school setting (OR 1.71 95%CI 1.21-2.42) and poor school performance (OR 2.10, 95%CI 1.40-3.16) had a significant positive relationship with depressive symptoms. Moreover, non-heterosexual sexual orientation (OR 2.01, 95% CI 0.91-4.44) showed a trend toward statistical significance.

Hosmer-Lemeshow goodness-of-fit tests indicated that the fit for the final models in males ( $P=0.5517$ ) and females ( $P=0.2254$ ) was satisfactory.

## **Chapter 9.0 Discussion**

The objectives of this study were to determine the frequency of depressive symptoms among male and female adolescents, to examine the associations between depressive symptoms and independent risk factors and to attempt to explain gender differences in depressive symptoms by understanding the role of body dissatisfaction (BD) and disordered eating behaviour (DEB) through use of multiple logistic regression procedures.

It was predicted that 1) females would have a significantly higher prevalence rate of depressive symptoms compared to males, 2) significant, positive associations between independent risk factors and depressive symptoms would be found among males and females, and 3) gender differences in depressive symptoms could be partially explained by BD and DEB concepts. Moreover, it was anticipated that religiosity, social support in the school setting, school performance, non-heterosexual sexual orientation, substance use behaviours, BD and DEB would be associated with depressive symptoms. Substance use behaviours were anticipated to be highly common among males, whereas, a strong association of DEB with risk of depressive symptoms in females was anticipated. It was expected that BD and DEB would explain a large amount of the variability in depressive symptoms for females.

The data indicated that females compared to males had a higher prevalence of depressive symptoms. Significant associations between independent risk factors and depressive symptoms were found in both males and females. Finally, the sequential logistic

regression determined that even after controlling for independent risk factors, DEB had a similar association with depressive symptoms in both males and females.

In this sample, 32.4% of females and 20.6% of males were found to have depressive symptoms based on the CES-D. These results were similar to current Canadian and American prevalence rates of depressive symptoms among adolescents. The HBSC survey found that 36% of females and 25% of males were at risk for depression,<sup>15</sup> while research conducted in northern Nova Scotia found a prevalence rate of 25% among females.<sup>14</sup> As with other studies, a statistically significant difference between genders was apparent in our sample.<sup>18-19</sup>

Intrapersonal, interpersonal and other risk factors that had well-established relationships with depressive symptoms among youth were examined to determine frequency as well as gender differences, with an emphasis on BD and DEB behaviours. More females compared with males engaged in DEB. It was expected that more females than males would be engaging in DEB, although it was not anticipated that BD would be similar between genders.

A number of the risk factors were related to an increased risk for depressive symptoms. Among males, the main predictor variables BD, DEB as well as potential confounding variables non-heterosexual sexual orientation, low SES and social support in the school setting, were all associated with an increased risk for depressive symptoms. Among females, the main predictor variables BD, DEB and other variables religious importance, school performance, non-heterosexual sexual orientation and social support in the school setting were associated with an increased risk for depressive symptoms.

The results show that an association exists between DEB and depressive symptoms for both genders even after controlling for the effects of several independent confounding risk factors. Past research has also detected a positive association between poorer school performance and depressive symptoms,<sup>40-41</sup> this relationship was evident among females even when all variables in the final model were statistically controlled for. Religious importance was low among adolescents and significant gender differences were found, with more males than females having low religious importance. Additionally, significant gender differences were found for poor school performance, regular substance use and disordered eating behaviour (DEB). More males than females had low religious importance, had poorer school performance and engaged in regular substance use.

### **9.1 Mediation**

This research confirms the associations between BD, DEB and depressive symptoms among adolescent females however; strong associations between BD, DEB and depressive symptoms in males were not expected. For females, when DEB was added to multiple logistic regression modelling procedures, BD lost significance indicating that BD may be affected by DEB and the two variables may not act independently. It is possible that DEB acted as a mediator for the association between BD and depressive symptoms because of the loss of significance when DEB was added. A close relationship exists between BD and DEB, as it is theoretically believed that one must have some level of BD in order to engage in DEB.<sup>26</sup> In males, when DEB was added to the final model, BD remained statistically significant, indicating that BD and DEB acted independently on risk for depressive symptoms among male adolescents. These results deserve further investigation.



The literature suggests that BD and DEB are behaviours that are restricted to, or more commonly experienced by females.<sup>26</sup> However, the results of this study suggested the contrary. This study showed that intrapersonal risk factors BD and DEB were prevalent among males and associated with an increased risk for depressive symptoms. The theory behind the use of BD and DEB variables to attempt to explain variance in depressive symptoms among males and females comes from the Gender Additive Model (GAM), a theoretical model posited by Stice and colleagues<sup>63</sup> which aims to clarify the increased prevalence of depressive symptoms among females through incorporation of body image and eating related components thought to be most prevalent among female adolescents. Depressive symptoms and DEB were more prevalent among females when compared to males even when other confounders were statistically controlled for, it could be inferred that DEB might play a role in the increased prevalence of depressive symptoms among adolescent females.

In the present research, the risk profile of DEB appeared to be similar between the genders in terms of its association with depressive symptoms. These results are similar to those of Santos and colleagues who found depressive symptoms and body image variables were associated in both males and females.<sup>16</sup> These findings differ from those of Stice and colleagues, who found some support for the GAM in female adolescents and did not find a relationship between DEB and depressive symptoms among males.<sup>63</sup>

Depression is associated with increased health care costs and medical care utilization. Moreover, adolescents who develop depressive symptoms may be afflicted for a long period of time with greater health care use and poorer social and personal outcomes in life.<sup>7-9</sup> Therefore, prevention of depressive symptoms, even at subclinical levels, is a

valuable goal with several important implications. Understanding the complexity of the risk factors affecting the adolescent depression trajectory presents a real challenge and lends strong support to the need for early screening efforts and the development of secondary prevention efforts addressing this multi-faceted disorder among youth in Nova Scotia.

In concordance with this reality, this research attempted to explain behavioural and other factors associated with risk for depressive symptoms among youth. The research was carried out as a cross-sectional study which was fitting as the objectives were exploratory in nature. The results showed that body dissatisfaction (BD) and disordered eating behaviour (DEB) were positively and statistically significantly associated with risk for depressive symptoms. Furthermore, for DEB, a similar association was seen in males (adjusted OR 3.35) and females (adjusted OR 3.40).

## **9.2 Policy and Practise Implications**

Depressive symptoms in adolescence are an important public health issue in Nova Scotia that require immediate attention. Of the 2010-2014 priorities related to Nova Scotia's Mental Health Strategy, the strengthening of mental health community supports is a priority related to this research.<sup>29</sup> Depressive disorders interfere with health and well-being and may direct the erosion of familial and peer relationships.<sup>4-5</sup> Adolescents suffering from depressive symptoms have increased co-morbidity and poorer overall health.<sup>6,10,15,16</sup> In addition, depression may become a life-long struggle for some thus stressing the importance of early, efficient and effective screening initiatives and prevention strategies.<sup>1-3</sup> Moreover, the risk of suicidality among male and female

adolescents emphasizes the urgent need to improve mental health services to this vulnerable group.<sup>12</sup>

At-risk youth may be identified through an increased understanding of the risk factors associated with depressive symptoms. This study demonstrated strong associations between intrapersonal risk factor DEB and depressive symptoms among both males and females. By targeting youth exhibiting these eating behaviours, an opportunity to reduce these behaviours as well as the occurrence of depressive symptoms may be possible. For example, if an adolescent male or female presents with depressive symptoms, they should be screened for disordered eating. Likewise, if the adolescent presents with disordered eating habits, they should be screened for depressive symptoms. Screening could occur in a number of settings including clinical, community and school based settings. A potential avenue for screening youth would be Student Based Health Centres (SBHCs). Health promotion and awareness information may also be distributed at this central base located in the school setting.

The results of this study may also be used to improve and strengthen community supports by informing the content of secondary prevention strategies indicated for at-risk youth, which could occur in community settings such as schools, community centres, churches and after-school programs.

This study identified key risk behaviours associated with depressive symptoms in both male and female adolescents. The results suggest that it may be useful to increase screening measures for DEB in males and females so as to prevent the escalation of these behaviours into more serious disorders, and to aid in the reduction of depressive

symptoms associated with these behaviours. The fact that these findings were evident in males as well as females did not provide a complete explanation for the increased prevalence of depressive symptoms among adolescent females. This could be a starting point for future research.

The most effective prevention programs for reducing depressive symptoms and future depression have been cognitive behavioural strategies.<sup>58</sup> These programs teach strategies such as identifying and handling negative thinking in addition to methods for dealing with everyday stress.<sup>58-61</sup> The development of problem solving skills are also core features of prevention programs aimed at reducing depressive symptoms among youth.<sup>1,58-61</sup>

Unlike pharmacological strategies used to reduce depressive symptoms, cognitive behavioural strategies teach adolescents' skills that can be applied in future situations.<sup>61</sup> When looking at subclinical depressive symptoms among youth, it makes theoretical sense to attempt and intervene with less evasive techniques, such as cognitive behavioural strategies, rather than begin a regimen of pharmaceuticals. In addition, the research is inconclusive, and in many cases the use of anti-depressants among adolescents is highly controversial.<sup>73,74</sup> This creates another layer of complexity for health professionals who are both trying to prevent and treat depression among youth.

Targeting BD, DEB and depressive symptoms among male and female adolescents represents secondary prevention. There are a number of risk behaviours and factors associated with depressive symptoms and unless screening efforts are developed that

target these behaviours in a variety of settings it will be challenging to reduce the prevalence of depressive symptoms in the adolescent population.

This project has clinical relevance as it demonstrates risk behaviours related to depressive symptoms among Nova Scotia youth. Awareness of the specific individual risk factors that play a role in depressive symptoms will aid in identifying adolescents at risk of depression in the clinical setting. In particular, the finding of the relationship of disordered eating with depressive symptoms in young men and women gives a strong indication that an emphasis on nutrition-related risk behaviours may help to identify adolescent males and females at risk for depressive symptoms. Given that BD and DEB can be precursors to eating disorders, such as bulimia and anorexia nervosa, it is critical that youth be identified for these behaviours. Better identification of youth who would benefit the most from prevention initiatives may be achieved through aggressive screening strategies implemented in both clinical and school-based settings. Examples include the school (through student-based health centres) and the physician's office (through simple intake questionnaires). Better identification of youth who exhibit disordered eating and thus may be at risk for future depression may help to reduce the inequality currently seen in access to and use of mental health services in Nova Scotia and Canada.<sup>75</sup>

### **9.3 Limitations**

The present study had several shortcomings. The cross-sectional nature of the data allowed for the establishment of associations with depressive symptoms, but did not allow for inferences of causation. The data were limited to a region of industrial Nova

Scotia, restricting generalizability to other populations. The survey was self-report which may have influenced results and limited some interpretations. Overall, there were a limited number of risk factors associated with depressive symptoms examined in our study. It was possible that some of the findings presented were the result of other risk factors not examined such as suicidality, negative life events, personality characteristics (such as negative affect) and familial factors (for example family structure).

Variables were constructed from a self-report survey that measured health behaviours; the constructed variables may not accurately represent the construct measured when compared to clinical scales that measure body dissatisfaction or substance use, for instance. Body dissatisfaction was defined as viewing oneself as anything but “the right weight.” This interpretation may not have been accurate as someone who is the right weight may still be dissatisfied with their body; however it was thought that if someone thought they were not the “right weight,” there would be some level of dissatisfaction associated with this.

#### **9.4 Future Directions**

Future prospective studies would be required to establish a direct relationship between DEB and depressive symptoms and lend directly to the development of prevention programs. However, given that the current study was cross-sectional in nature, only a statistical association could be concluded with the results being limited in generalizability. Therefore, results from the current research could be used to inform the content of secondary prevention programs in school settings across Nova Scotia that address the complex interactions between DEB and depressive symptoms among

adolescent males and females. The indication that DEB may act as a mediator in the association between BD and depressive symptoms in females deserves further investigation. Additionally, given that BD and DEB were associated with depressive symptoms in males, future prospective studies could provide insight into the trajectory of these risk behaviours among males.

## **9.5 Conclusions**

The current study aids in the understanding of gender differences and similarities in risk for depressive symptoms. This study demonstrated a strong positive association between BD, DEB and depressive symptoms among adolescent males and females, with a similar odds ratio for risk of depressive symptoms if the adolescent engaged in DEB. Accordingly, to reduce disparity, we must develop initiatives in Nova Scotia that address body image and eating behaviours in both male and female adolescents. This research represents a step toward promoting healthier individuals and communities and ensuring better mental well-being among youth in Nova Scotia, particularly those considered most vulnerable.

## Appendix I Tables One Through Eleven

**Table 1.** Frequency of individual and other risk factors of participants by gender

<b>Variable</b>	<b>Male N=718 N (%)</b>	<b>Female N=713 N (%)</b>	<b>chi-square</b>	<b>p-value</b>
<b>Age</b>				
<b>15</b>	70 (9.8)	74 (10.4)	---	---
<b>16</b>	246 (34.3)	241 (33.8)		
<b>17</b>	221 (30.8)	242 (33.9)		
<b>18</b>	156 (21.7)	146 (20.5)		
<b>19</b>	25 (3.5)	10 (1.4)		
<b>CES-D + for Depressive Symptoms</b>	148 (20.6)	231 (32.4)	25.52	<0.001
<b>Socio-economic Status &lt; Average</b>	63 (8.8)	61 (8.6)	0.022	0.883
<b>Low Religious Importance</b>	393 (54.7)	306 (42.9)	19.99	<0.001
<b>Low Social Support</b>	285 (39.7)	314 (44.0)	2.78	0.096
<b>Average Grade &lt; 70%</b>	224 (31.2)	148 (20.8)	20.27	<0.001
<b>Non-heterosexual Sexual Orientation</b>	26 (3.6)	33 (4.6)	0.92	0.338
<b>Early Sex (&lt;15 years old)</b>	101 (14.1)	118 (16.6)	1.70	0.192
<b>Regular Substance Use</b>	330 (46.0)	247 (34.6)	19.05	<0.001
<b>Body Dissatisfaction</b>	304 (42.3)	317 (44.5)	0.65	0.418
<b>Disordered Eating Behaviour</b>	69 (9.6)	130 (18.2)	22.21	<0.001



**Table 2.** Associations between the dependent variable (depressive symptoms, as indicated by CES-D score above cut-point of 22) and each of the independent variables (individual and other risk factors), Male (N=718)

<b>Independent Variable</b>	<b>N in each category</b>	<b>% CES-D+</b>	<b>chi-square</b>	<b>p-value*</b>
<b>SES</b>				
< Average	63	38.1		
Average and above	655	18.9	12.90	<0.001
<b>Religious Importance</b>				
Low	393	23.2		
High	325	17.5	3.43	0.064
<b>Others Helpful</b>				
No	285	30.2		
At least somewhat	433	14.3	26.41	<0.001
<b>Average Grade</b>				
<70%	224	24.1		
≥ 70%	494	19.0	2.43	0.119
<b>Non-heterosexual</b>				
Yes	26	42.3		
No	692	19.8	7.76	0.005
<b>Early Sex (&lt; 15 years)</b>				
Yes	101	26.7		
No	617	19.6	2.69	0.101
<b>Regular Substance Use</b>				
Yes	330	23.3		
No	388	18.3	2.76	0.097
<b>Body Dissatisfaction</b>				
Yes	304	27.3		
No	414	15.7	14.42	<0.001
<b>Disordered Eating Behaviour</b>				
Yes	69	44.9		
No	649	18.0	27.58	<0.001

\*Comparison of the proportion with depressive symptoms for those with vs. those without the risk factor of interest

**Table 3.** Associations between the dependent variable (depressive symptoms, as indicated by CES-D score above cut-point of 24) and each of the independent variables (individual and other risk factors), Female (N=713)

<b>Independent Variable</b>	<b>N in each category</b>	<b>% CES-D+</b>	<b>Chi-square</b>	<b>p-value*</b>
<b>SES</b>				
< Average	61	44.3	4.29	0.038
Average and above	652	31.3		
<b>Religious Importance</b>				
Low	306	37.6	6.58	0.010
High	407	28.5		
<b>Others Helpful</b>				
No	314	41.7	22.26	<0.001
At least somewhat	399	25.1		
<b>Average Grade</b>				
<70%	148	49.3	24.43	0.010
≥ 70%	565	28.0		
<b>Non-heterosexual</b>				
Yes	33	60.6	12.57	<0.001
No	680	31.0		
<b>Early Sex (&lt; 15 years)</b>				
Yes	118	39.0	2.80	0.094
No	595	31.1		
<b>Regular Substance Use</b>				
Yes	247	36.0	2.28	0.131
No	466	30.5		
<b>Body Dissatisfaction</b>				
Yes	317	39.1	11.76	<0.001
No	396	27.0		
<b>Disordered Eating Behaviour</b>				
Yes	130	60.8	58.43	<0.001
No	583	26.1		

\*Comparison of the proportion with depressive symptoms for those with vs. those without the risk factor of interest

**Table 4.** Crude and stratum specific (by SES) odds ratio for the association between depressive symptoms and individual and other risk factors, Male (N=718)

Risk Factor	Crude OR	Stratum Specific OR	
		SES above avg.	SES below avg.
<b>Low Religious Importance*</b>	1.42	1.23	3.25
<b>Low Social Support*</b>	2.59	2.61	1.39
<b>Poor School Performance*</b>	1.35	1.21	2.25
<b>Non-heterosexual Sexual Orientation</b>	2.97	3.12	†
<b>Early Sex (&lt;15 years old)</b>	1.50	1.58	†
<b>Regular Substance Use</b>	1.36	1.31	1.47
<b>Body Dissatisfaction*</b>	2.02	2.09	1.08
<b>Disordered Eating Behaviour</b>	3.71	3.37	†

\*effect modification likely to be present

†insufficient cell-size to determine stratum specific odds ratio

**Table 5.** Crude and stratum specific (by SES) odds ratio for the association between depressive symptoms and individual and other risk factors, Female (N=713)

<b>Risk Factor</b>	<b>Crude OR</b>	<b>Stratum Specific OR</b>	
		<b>SES above avg.</b>	<b>SES below avg.</b>
<b>Low Religious Importance</b>	1.51	1.56	1.04
<b>Low Social Support</b>	2.14	2.07	2.53
<b>Poor School Performance</b>	2.51	2.50	1.94
<b>Non-heterosexual Sexual Orientation</b>	3.42	4.15	†
<b>Early Sex (&lt;15 years old)</b>	1.41	1.58	†
<b>Regular Substance Use</b>	1.29	1.28	0.96
<b>Body Dissatisfaction</b>	1.74	1.85	2.67
<b>Disordered Eating Behaviour</b>	4.39	4.36	4.41

†insufficient cell-size to determine stratum specific odds ratio

**Table 6.** Results of Multiple Logistic Regression Procedure for Model 1, Males (N=718)\*

<b>Risk Factor</b>	<b>Odds Ratio</b>	<b>95% CI</b>	<b>p-value</b>
<b>SES &lt; Average</b>	2.12	1.20-3.74	0.009
<b>Low Religious Importance</b>	1.28	0.87-1.88	0.216
<b>Low Social Support</b>	2.30	1.57-3.35	<0.001
<b>Poor School Performance</b>	1.14	0.76-1.70	0.535
<b>Non-heterosexual Sexual Orientation</b>	2.59	1.12-5.98	0.026
<b>Early Sex (&lt;15 years old)</b>	1.32	0.79-2.23	0.292
<b>Regular Substance Use</b>	1.30	0.87-1.94	0.199
<b>Body Dissatisfaction</b>	---	---	----
<b>Disordered Eating Behaviour</b>	---	---	---

\*age and school site statistically controlled for

**Table 7.** Results of Multiple Logistic Regression Procedure for Model 2, Males (N=718)\*

<b>Risk Factor</b>	<b>Odds Ratio</b>	<b>95% CI</b>	<b>p-value</b>
<b>SES &lt; Average</b>	1.93	1.09-3.44	0.025
<b>Low Religious Importance</b>	1.26	0.85-1.85	0.251
<b>Low Social Support</b>	2.22	1.52-3.26	<0.001
<b>Poor School Performance</b>	1.09	0.73-1.64	0.668
<b>Non-heterosexual Sexual Orientation</b>	2.42	1.04-5.64	0.041
<b>Early Sex (&lt; 15 years old)</b>	1.46	0.86-2.48	0.164
<b>Regular Substance Use</b>	1.33	0.89-1.99	0.169
<b>Body Dissatisfaction</b>	1.89	1.28-2.77	0.001
<b>Disordered Eating Behaviour</b>	---	---	---

\*age and school site statistically controlled for

**Table 8.** Results of Multiple Logistic Regression Procedure for Model 3, Males (N=718)\*

<b>Risk Factor</b>	<b>Odds Ratio</b>	<b>95% CI</b>	<b>p-value</b>
<b>SES less than Average</b>	2.00	1.11-3.59	0.021
<b>Low Religious Importance</b>	1.28	0.86-1.91	0.217
<b>Low Social Support</b>	2.33	1.58-3.45	<0.001
<b>Poor School Performance</b>	1.08	0.71-1.64	0.706
<b>Non-heterosexual Sexual Orientation</b>	1.93	0.80-4.70	0.143
<b>Early Sex (&lt; 15 years old)</b>	1.46	0.85-2.50	0.168
<b>Regular Substance Use</b>	1.20	0.80-1.81	0.381
<b>Body Dissatisfaction</b>	1.72	1.16-2.54	0.007
<b>Disordered Eating Behaviour</b>	3.35	1.92-5.86	<0.001

\*age and school site statistically controlled for

**Table 9.** Results of Multiple Logistic Regression Procedure for Model 1, Females (N=713)\*

<b>Risk Factor</b>	<b>Odds Ratio</b>	<b>95% CI</b>	<b>p-value</b>
<b>SES &lt; Average</b>	1.30	0.74-2.30	0.361
<b>Low Religious Importance</b>	1.29	0.92-1.80	0.134
<b>Low Social Support</b>	1.98	1.42-2.76	<0.001
<b>Poor School Performance</b>	2.33	1.57-3.46	<0.001
<b>Non-heterosexual Sexual Orientation</b>	2.14	1.01-4.56	0.048
<b>Early Sex (&lt; 15 years old)</b>	1.16	0.75-1.80	0.508
<b>Regular Substance Use</b>	1.02	0.71-1.47	0.911
<b>Body Dissatisfaction</b>	---	---	---
<b>Disordered Eating Behaviour</b>	---	---	---

\*age and school site statistically controlled for



**Table 10.** Results of Multiple Logistic Regression Procedure for Model 2, Females (N=713)\*

<b>Risk Factor</b>	<b>Odds Ratio</b>	<b>95% CI</b>	<b>p-value</b>
<b>SES &lt; Average</b>	1.32	0.75-2.33	0.340
<b>Low Religious Importance</b>	1.27	0.91-1.78	0.155
<b>Low Social Support</b>	1.94	1.39-2.71	<0.001
<b>Poor School Performance</b>	2.28	1.53-3.39	<0.001
<b>Non-heterosexual Sexual Orientation</b>	2.04	0.95-4.38	0.066
<b>Early Sex (&lt; 15 years old)</b>	1.20	0.77-1.87	0.410
<b>Regular Substance Use</b>	1.05	0.73-1.51	0.793
<b>Body Dissatisfaction</b>	1.62	1.16-2.26	0.004
<b>Disordered Eating Behaviour</b>	---	---	---

\*age and school site statistically controlled for

**Table 11.** Results of Multiple Logistic Regression Procedure for Model 3, Females (N=713)\*

<b>Risk Factor</b>	<b>Odds Ratio</b>	<b>95% CI</b>	<b>p-value</b>
<b>SES &lt; Average</b>	1.34	0.75-2.41	0.325
<b>Low Religious Importance</b>	1.33	0.94-1.88	0.104
<b>Low Social Support</b>	1.71	1.21-2.42	0.002
<b>Poor School Performance</b>	2.10	1.40-3.16	<0.001
<b>Non-heterosexual Sexual Orientation</b>	2.01	0.91-4.44	0.084
<b>Early Sex (&lt; 15 years old)</b>	1.16	0.73-1.82	0.533
<b>Regular Substance Use</b>	0.99	0.68-1.44	0.964
<b>Body Dissatisfaction</b>	1.39	0.98-1.96	0.063
<b>Disordered Eating Behaviour</b>	3.40	2.23-5.19	<0.001

\*age and school site statistically controlled for

## Appendix II Applicable Survey Questions From Original Survey

**Research Study:** School Based Health Centres in Cape Breton: Gathering Evidence to Inform Policy and Practice: Health Services Evaluation and Behaviours Survey

**May 2006**

### Applicable Survey Questions:

**4.2** I had vaginal sex for the **first time** when I was \_\_\_\_\_years old.

Not Applicable \_\_\_\_ (never had vaginal sex)

**5.8** During the past 30 days, on how many days did you have 5 or more drinks of alcohol in a row, that is, within a couple of hours?

- |   |             |   |                 |
|---|-------------|---|-----------------|
| 1 | 0 days      | 5 | 6 to 9 days     |
| 2 | 1 day       | 6 | 10 to 19 days   |
| 3 | 2 days      | 7 | 20 or more days |
| 4 | 3 to 5 days |   |                 |

**5.11** During the past 30 days, how many times did you use marijuana?

- |   |                  |
|---|------------------|
| 1 | 0 times          |
| 2 | 1 or 2 times     |
| 3 | 3 to 9 times     |
| 4 | 10 to 19 times   |
| 5 | 20 to 39 times   |
| 6 | 40 or more times |

7.1 How do **you** describe your weight?

- 1 Very underweight
- 2 Slightly underweight
- 3 About the right weight
- 4 Slightly overweight
- 5 Very overweight

7.5 During the past 30 days, did you **go without eating for 24 hours or more** (also called fasting) to lose weight or to keep from gaining weight?

- 1 Yes
- 2 No

7.6 During the past 30 days, did you **take any diet pills, powders, or liquids** without a doctor's advice to lose weight or to keep from gaining weight? (Do **not** include meal replacement products such as Slim Fast.)

- 1 Yes
- 2 No

7.7 During the past 30 days, did you **vomit or take laxatives** to lose weight or to keep from gaining weight?

- 1 Yes
- 2 No

**8.0 Your Mood:** The next questions ask about how you are feeling in terms of your mood. Please indicate how often you felt this way during the past week by circling the appropriate number.

During the past week:	Rarely or none of the time (less than 1 day)	Some or a little of the time (1- 2 days)	Occasionally or a moderate amount of the time (3-4 days)	Most or all of the time (5- 7 days)
8.1 I was bothered by things that usually don't bother me	0	1	2	3
8.2 I did not feel like eating: my appetite was poor	0	1	2	3
8.3 I felt that I could not shake off the blues even with help from my family or friends	0	1	2	3
8.4 I felt that I was just as good as other people	0	1	2	3
8.5 I had trouble keeping my mind on what I was doing	0	1	2	3
8.6 I felt depressed	0	1	2	3
8.7 I felt that everything I did was an effort	0	1	2	3
8.8 I felt hopeful about the future	0	1	2	3
8.9 I thought my life had been a failure	0	1	2	3
8.10 I felt fearful	0	1	2	3
8.11 My sleep was restless	0	1	2	3
8.12 I was happy	0	1	2	3
8.13 I talked less than usual	0	1	2	3
8.14 I felt lonely	0	1	2	3
8.15 People were unfriendly	0	1	2	3
8.16 I enjoyed life	0	1	2	3
8.17 I had crying spells	0	1	2	3
8.18 I felt sad	0	1	2	3
8.19 I felt that people dislike me	0	1	2	3
8.20 I could not get going	0	1	2	3

**9.1** Please check which of the following two statements you agree with (Please check one only):

\_\_\_ Most of the people I go to school with can be trusted.

OR

\_\_\_ You can't be too careful of the people I go to school with.

**10.1** Are you male or female?

1 Male

2 Female

**10.2** What is your age in years? \_\_\_ years

**10.4** What was your overall average mark on your last report card?

1 less than 50      4 70-79

2 50-59            5 80-89

3 60-69            6 90-100

**10.5** People have different feelings about themselves when it comes to questions of being attracted to other people. Which of the following best describes your feelings?

1 100% heterosexual (attracted to persons of the opposite sex)

2 Mostly heterosexual

3 Bisexual (attracted to both males and females)

4 Mostly homosexual

5 100% homosexual ("gay or lesbian"; attracted to persons of the same sex)

6 Not sure

**10.9** How well off do you think your family is compared to other teens in your school?

- 1 Very well off
- 2 Quite well off
- 3 Average
- 4 Not very well off
- 5 Not at all well off

**10.15** How important would you say religion is to you? Is it:

- 1 Not important at all
- 2 Not very important
- 3 Fairly important
- 4 Very important

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