Evaluation of Risk Behaviors among Oregon's Youth with Chronic Health, Emotional or Learning Conditions

by

Rachel Caroline Tsu

Presented to the Department of Public Health and Preventive Medicine

and the Oregon Health Sciences University

School of Medicine

in partial fulfillment of the requirements for the degree of

Master of Public Health

May 2002

School of Medicine

Oregon Health Sciences University

CERTIFICATE OF APPROVAL

This is to certify that the Master's thesis of

Rachel Caroline Tsu

has been approved

[redacted]

Jodi Lapidus, Ph.D.

[redacted]

Lori Lambert, M.A.

[redacted]

Wayne Sells, M.D.

[redacted]

Richard Mauer, M.D.

Table of Contents

Tables

Acknowledgements

I would like to thank and express my gratitude to Jodi Lapidus, Lori Lambert and Wayne Sells for their time, guidance and support during this project. I would also like to thank the Oregon Health Division and the persons involved with the collection and provision of the 1999 Oregon Youth Risk Behavior Survey upon which this thesis is based.

Abstract

With improved diagnostics, interventions and treatments the prevalence of childhood chronic health conditions has increased over the last century. The effects of a chronic health condition are partly dependent upon the current developmental stage of the child. During adolescence, the presence of a chronic health condition may make developmental processes such as identity formation, conforming to social norms within a peer group, and independence from parents more challenging.[1, 2]

Experimentation, a normal part of adolescence, may include engagement in risk behaviors. For youth with chronic health conditions engagement in risk behaviors may result in an exacerbation of health consequences, increasing the potential for morbidity and mortality.[3, 4] Due to the potential impact of chronic health conditions on adolescent development, it is important to gain a better understanding of the lives of youth with chronic health conditions and their engagement in risk behaviors.

Data from the 1999 Oregon Youth Risk Behavior Survey was used to identify youth with chronic medical, emotional and learning conditions. Univariate and multiple logistic regression was performed to examine the relationship between chronic health conditions and a variety of risk behaviors stratified by gender. The association with risk and protective factors was also examined.

Nearly 32% of youth reported having at least one of these chronic health conditions. Youth reporting chronic health conditions were at least as likely, and often more likely, to report a variety of risk behaviors as compared to youth without chronic health conditions. Youth with chronic health conditions were less likely than youth without chronic health conditions to report protective factors (having a caring adult in their life, having family meals, participating in

community or school activities, participating in team sports) and more likely to report physical or sexual abuse.

Overwhelmingly, youth with chronic health conditions are at increased risk for decreased health and well-being, however this relationship is a dynamic and complex one. When working with youth with chronic health conditions it is important to consider a holistic approach not only in addressing their increased risk for multiple risk behaviors, but also their increased risk for physical and sexual abuse. In working through the challenges of adolescent development, efforts to increase protective factors can benefit all youth.

Introduction

Children and adolescents with chronic health conditions represent an growing and understudied population. As appropriate technology and therapy become accessible, children with chronic health conditions are increasingly participating in mainstream culture and attending public schools. What defines a childhood chronic health condition is broadening to encompass not only medical conditions, but also learning and emotional conditions.

Chronic Health Conditions

Over the last century the composition of illnesses affecting children in the United States has changed dramatically. While the prevalence of infectious diseases has decreased, the number of children affected by chronic medical conditions such as asthma and diabetes has increased. This change in prevalence is not so much the effect of changes in incidence but instead reflects the increasing number of children surviving into adolescence and adulthood due to technological advances and improved medical care.[5, 6] Published prevalence estimates of childhood chronic medical conditions range from less than 10% to more than 30%.[7, 8, 9] A study of the 1988 National Health Interview Survey (NHIS) data using a relatively inclusive definition estimated 31.5% of children between the ages of 10 and 17 having one or more chronic medical conditions.[8] The most prevalent conditions consistently reported include respiratory allergies, asthma, frequent/severe headaches and eczema/ skin allergies.

While the prevalence, nature and severity of individual conditions may vary, there are important commonalities in the experiences of children living with chronic health conditions. Youth with chronic medical conditions report higher use of medical services and more days absent from school due to illness, which can interfere with learning and socialization that takes

place at school.[8] Adolescents with a chronic medical condition are also more likely to have behavioral problems, report depression and be socially withdrawn.[7] Children with chronic medical conditions are increasingly being recognized as facing additional developmental challenges and burdens and therefore having additional needs.

Other childhood chronic health conditions, such as learning and emotional conditions, also contribute to challenges in normal development and increase the needs of children and their families for services. Learning conditions such as learning disabilities (LD), attention deficit disorder (ADD) and attention deficit hyperactivity disorder (ADHD) are prevalent among youth. Reported prevalence estimates range from 6.5% to 9.8% for learning disabilities[10, 11, 12] and from 4-12% in younger children to 3-5% in adolescents for ADHD.[13, 14] Youth with ADHD access more mental health and primary care services, more pharmacy services and more hospital services than youth without ADHD.[15, 16] Unlike chronic medical conditions where the incidence ratios are fairly similar for males and females, learning conditions are more likely to be found in males than in females.[10, 11, 12] While there is some variability in behavioral and cognitive characteristics by gender, overall youth with learning conditions report more behavior problems, lower self-esteem and fewer peer relationships than youth without learning conditions.[11, 14, 17]

Emotional conditions such as anxiety disorders, depression and eating disorders represent a third group of chronic health conditions affecting youth. Emotional conditions are more prevalent among females than males. Approximately five to ten percent of children and adolescents in the general population suffer from depressive disorders.[18, 19] Depressive disorders decrease overall well being and are associated with increased risk of suicide, violence, substance use and risky sexual behavior.[18, 19] Anxiety disorders affects between one and nine

percent of adolescents and there is a high comorbidity between anxiety disorders and other mental disorders, primarily major depression disorder.[20, 21] Adolescents with eating disorders also report increased depression and low self-esteem. Approximately one percent of teenage females develop anorexia nervosa, and around five percent of older adolescents and younger adult females develop bulimia nervosa.[22] Of the adolescents and young adults diagnosed with anorexia and bulimia, approximately 90% are female. Eating disorders are associated with significant effects on psychological and physiological health and well being.[22, 23] Thus emotional conditions such as depression, anxiety and eating disorders may have a significant effect on youth and their families.

Adolescence, Risk Behaviors and Chronic Health Conditions

Adolescence is a crucial developmental period defined by significant biological, cognitive and psychosocial change, accented with exploration and experimentation of values and behaviors.[24, 25] Previous research provides evidence to support that childhood chronic health conditions increase the burden on both children and their families and may interfere with the normal developmental processes. The term "risk behaviors" has come to encompass a number of behaviors with potentially adverse health outcomes to an individual's health and well-being.[25] And indeed, research has shown that leading causes of adolescent morbidity and mortality involve behaviors such as drinking alcohol and driving, not wearing seatbelts and engaging in unprotected sexual intercourse.[26, 27] Data concerning youth with chronic health conditions and engagement in risk behaviors is limited and somewhat varied. Some studies have shown lower proportions of risk behaviors among youth with chronic health conditions.[28, 29] Reasons given for lower proportions of risk behaviors have included parental overprotectiveness

due to the health condition and fewer exposures to social pressures facing youth without health conditions. However, recent studies involving population based samples tend to show that adolescents with chronic health conditions engage in risk behaviors at proportions similar to or greater than adolescents without chronic health conditions.[14, 30-33] While the reasons for engagement in risk behaviors are varied and complex, youth with chronic health conditions may be more likely to engage in risk behaviors as a way to exert independence or gain peer approval. Undoubtedly, regardless of the reason for engagement in risk behaviors, the effects can be more devastating to youth with chronic health conditions. For example, alcohol consumption among youth with insulin-dependent diabetes mellitus places them at risk for alcohol induced hypoglycemia [3], and smoking among youth with chronic lung disease accelerates decline in pulmonary function [28].

Results from studies of adolescents with chronic medical conditions and their engagement in risk behaviors vary. A study of adolescents with cystic fibrosis and sickle cell disease showed lower proportions of engagement in a variety of risk behaviors as compared to healthy peers.[28] Potential hypotheses for the lower proportions included delayed maturation and fewer opportunities to engage in risk behaviors. For youth with a condition where puberty is delayed or where mobility is impaired, social and sexual opportunities may be limited.[34] While these youth may be less likely to be sexually active, they may also be less likely to use contraception and less knowledgeable of reproductive issues.[29] Delayed puberty can also result in feelings of inadequacy and depression due to being "different" than peers.[35] On the other hand, early pubertal development, which is caused by some chronic medical conditions, may place adolescents at risk for early sexual debut and associated problem behaviors.[36] A study involving secondary public schools found that youth identifying with a chronic medical

condition were as sexually active as their peers and were influenced by the same social pressures toward sexual debut and unprotected sex as their peers.[30] While the proportion of sexual behavior is varied, there may be increased risk of adverse outcomes due to pregnancy among youth with chronic health conditions. Medications needed for management of some conditions, such as seizure disorders and cancer, may be harmful to the fetus.[34] The presence of some chronic medical conditions, such as sickle cell disease and thyroid disease, are associated with complications in pregnancy and increased morbidity and mortality for mother and infant.[34] Adolescents with chronic medical conditions are also more likely to report body dissatisfaction and disordered eating than youth without a chronic condition.[31, 37] In addition, the presence of a mobility impairment is associated with increased suicide attempts, regular cigarette smoking, alcohol use and sexual intercourse before the age of 12.[33]

Youth with learning conditions are also at risk for engagement in behaviors with adverse health outcomes. Adolescents with learning disabilities are at increased risk for depression and suicide [32, 33], violence and weapon carrying [11] and risky sexual behavior [33]. There are discrepancies in the reported relationship between substance use and learning disabilities. A study by Maag et al. [38] found that adolescents with learning disabilities are more likely to use tobacco and marijuana than controls, whereas a study by Svetaz et al. [11] found lower alcohol and marijuana use among adolescents with learning disabilities and slightly more cigarette smoking among males with learning disabilities. Adolescents with attention deficit hyperactivity disorder (ADHD) are more likely than youth without ADHD to report substance abuse.[14] ADHD is also associated with unsafe driving habits such as speeding, increasing the risk of motor vehicle fatalities and bodily injuries.[14]

Emotional conditions such as eating disorders, depression and anxiety disorders among adolescents are associated with substance use, risky sexual behavior and suicidal behavior.[19, 33, 39, 40] Adolescents with bulimia nervosa are likely to be impulsive, not only in their eating behavior, but also in their use of drugs, alcohol and sexual behavior.[22] The combination of risky sexual behavior and eating disorders increases the risk of premature birth and low birth weight babies.[41] Adolescents with eating disorders are also more likely than healthy peers to report depression and exhibit suicidal behavior, with suicidal behavior a major contributing factor to the high mortality rate among youth with anorexia nervosa.[23] Adolescents with eating disorders report feeling "in control" when engaged in weight control behaviors. Thus the development of an eating disorder can be precipitated by interpersonal difficulties with friends or parents and can also provide a mechanism for coping with these problems.[22]

Risk and Protective Factors

Physical and sexual abuse are associated with a number of risk behaviors. Adolescents who experience physical and sexual abuse are more likely than healthy peers to report disordered eating and substance use such as smoking, drinking and illicit drug use.[42, 43] Adolescents exposed to family violence suffer from a range of problems such as substance abuse, poor school achievement, aggressive behavior, serious injuries, health problems, depression and suicide attempts.[44] Younger adolescents are more likely to be victimized by their parents, whereas older adolescents are more likely to be abused by their peers.[44] Approximately 20% of female high school students have reported being physically or sexually abused by a dating partner.[45] The experience of dating violence is associated with the increased engagement among female high school students in a number of risk behaviors including substance use, unhealthy weight-control practices, and sexual risk behaviors, and suicide consideration and attempts. [45]

There is research showing an association between physical and sexual abuse and chronic health conditions. In adolescents and adults, childhood physical and sexual abuse are associated with emotional conditions such as major depression and anxiety disorders [44, 46] and eating disorders.[22] An association has been identified between childhood ADHD and a history of physical or sexual abuse.[47] Youth with chronic medical conditions are also more likely to report sexual [26, 30, 31] or physical abuse [31].

Some youth who appear at high risk to participate in risk behaviors do not in fact engage in these behaviors but successfully negotiate adolescence.[48] Interest in the contributing factors of resiliency have led to the identification of protective factors, that when present, decrease the likelihood of negative health and social outcomes.[48, 49] Components of resiliency lie in three general areas: individual characteristics such as spirituality or self-esteem, family characteristics such as connectedness or cohesion, and external characteristics such as school and/or community involvement or supportive peer and adult networks.[50-54]

There are few studies that look at protective factors among youth with chronic health conditions. A clinic based study involving adolescents with cystic fibrosis or diabetes showed similar coping strategies, such as developing social support or spiritual support, by the youth with chronic health conditions as compared to youth without chronic health conditions.[55] However, from population based studies, youth with chronic medical conditions, learning or emotional conditions, appear to report fewer protective factors, such as school connectedness, than their healthy peers.[31, 33]

Youth Risk Behavior Survey

The Youth Risk Behavior Survey (YRBS) was developed by the Centers for Disease Control and Prevention (CDC) and used as a tool, beginning in 1990, to measure those behaviors

that lead to the major health problems in the United States. During the developmental stage of the YRBS, investigations into the principal causes of morbidity and mortality among adolescents and young adults identified a relatively small number of risk behaviors: those that result in unintentional and intentional injuries; tobacco use; alcohol and drug use; sexual behaviors contributing to unintended pregnancy and sexually transmitted infections (STIs); dietary behaviors that result in significant medical problems; and physical inactivity.[27] From these categories a multiple choice, self-administered, pen and paper, anonymous questionnaire, the YRBS, was developed for national use among public high-school students. The YRBS is currently administered nationally every two years for youth grades 9th through 12th, to assess the prevalence of these health risk behaviors, and to follow changes in those behaviors over time on a national, state and local level.

Nationally the YRBS is considered to be a valid and reliable measure of health behaviors among the adolescent population.[27, 56] The questions of the original YRBS were examined for reliability by test-retest application soon after its debut.[56] Questions with a reference period ("yesterday", "last time", "in the past seven days") inconsistent with the test-retest two-week time frame, were eliminated. The items were dichotomized, as the reliability is expected to be greater than with finer gradations of risk. A kappa statistic was computed for each item and scored using a scale developed by Landis and Koch. The majority of the items (72%) scored as "substantial" agreement or higher, and 90% of items scored "moderate" agreement or higher. Items with the lowest kappa scores included: ever used injected drugs, ever been told one had a sexually transmitted disease, used cocaine during the past 30 days, and will try cigarette during the next 12 months. These scores can partially be explained by the kappa score sensitivity to inconsistencies among very low prevalence or very high prevalence items. Similar reliability

estimates were found for males and females, however responses were more consistent for 8th graders and above as compared with 7th graders. Reliability was also higher for items using "lifetime" as a reference point as compared "in the past 30 days" or "past 12 months." Examination of validity for risk behaviors is challenged by the difficulty of establishing "gold standards," however research supports the validity of self-reported risk behaviors by youth.[27, 57] Anonymity and voluntary participation, as used with the administration of the YRBS, increase the likelihood of accurate reporting by youth, as well as external checks of validity such as inclusion of fictitious drug use questions.[57]

The current study involved a secondary data analysis of the 1999 Oregon YRBS. In Oregon the YRBS has been administered every other year since its introduction in 1991. Participation is facilitated by the Oregon Health Division and the Oregon Department of Education, and is voluntary at every level: school district, principal, parent, and student. The CDC recommends a two-stage cluster sample design: randomly sampling schools and then encouraging the schools to randomly select classes. In 1999, of the 47 randomly selected Oregon schools, 26 (55%) choose to participate, which was insufficient to be included in the national data. When all public Oregon schools were invited to participate, 85 additional schools choose to do so. The surveys were administered between January and June of 1999. Although schools were encouraged to draw a random number of classes in which every student in all grades had an equal chance of being selected, individual schools determined the sampling method of their own classrooms. Usable surveys were provided by 109 Oregon public schools.

Surveys were reviewed for consistency by the Oregon Health Division, Centers for Health Statistics. Surveys determined to be invalid for one or more reasons are removed from the data set. In 1999, surveys were considered invalid based on a drug-use verification question;

more than 62 blank or unknown answers out of 121 questions; more than 10 discrepancies among answers; more than 30 outrageous or socially negative responses; or missing gender, invalid age, invalid race or grade other than 9^{th}-12^{th}. Of the usable 25,095 surveys, 2182 (8.7%) were excluded based upon the above validation checks. The final 1999 Oregon YRBS data set was a convenience sample of 22,913 surveys. Although not a random sample, the respondents were representative of Oregon's high school students in relation to enrollment for grade, school size, and school socioeconomic level.

Objective

There are few population-based studies that look at health risk behaviors among adolescents identifying with a chronic health condition. The 1999 Oregon Youth Risk Behavior Survey (YRBS) provide an opportunity to look at this issue among Oregon's public high school students. The purpose of this study was to explore the health risk behaviors among youth who identify themselves as having a chronic medical, emotional, or learning condition as compared to youth who do not report a chronic health condition. The first objective was to explore demographic characteristics of individuals who identify with a health condition using the 1999 Oregon YRBS. A second objective was to examine the relationship between presence of a chronic health condition and a number of risk behaviors. The third objective was to see how the presence of risk and protective factors changed the relationship between chronic health conditions and risk behaviors. The final objective was to explore whether the presence of a limitation in activity changed the relationship between chronic health conditions and risk behaviors. It was hypothesized that youth who identify themselves as having a chronic medical, emotional, or learning condition are at least as likely or more likely to participate in high-risk behaviors as compared to their peers who do not identify with a chronic health condition.

Methods

The current study involved a secondary analysis of the data collected in the 1999 Oregon Youth Risk Behavior Survey (OYRBS). The data set as obtained from the Oregon Health Division, Center for Health Statistics, was weighted for school enrollment, socioeconomic ranking, and grade level. In the current study youth with and without chronic health conditions were compared, so data were unweighted. The three chronic health condition questions were included in the 1999 Oregon YRBS, and served as the basis for the secondary data analysis. The specific questions used in the analysis are included in Appendix A.

The first question asked about the presence of a health condition (chronic medical, emotional or learning condition) as diagnosed by a health care or other professional. Missing responses for this question (1776) were not included in further analysis. The second and third chronic health condition questions concerned condition-related limitations and condition visibility. An additional 1684 surveys were recoded as missing and not included in further analysis due to inconsistent responses among the chronic health condition questions, such as youth reporting "never been told I have any…condition…" and also reporting condition related limitations. Surveys were also removed from further analysis if age or race was missing (251). The final data set consisted of 19,202 surveys.

Description of Variables Used

The analysis focused on youth who identify with one of the following health conditions: a chronic medical condition, emotional condition, or learning condition. Youth were considered to have a chronic health condition if they report being diagnosed by a health care professional with either a chronic medical condition, emotional condition, or learning condition. A composite

variable was created to identify youth as having no health conditions, only chronic medical conditions, only emotional conditions, only learning conditions, or multiple types of conditions. Youth were considered without a health condition if they did not report having any of the listed health conditions *and* they do not report condition-related activity limitation or condition visibility.

In addition to the presence of a health condition, data were collected on condition-related disability and the visibility of the condition. Youth were asked about activity limitations due to their health condition in the following categories: participation in school, physical activities, making friends, and personal care. Among youth reporting a health condition, the presence of activity limitation(s) was collapsed into a new "limitation" variable as a dichotomous "absent" or "present" variable.

Demographic variables, except gender, were recoded. The "age" variable was recoded as a five category "14 and younger, 15, 16, 17, 18 and older" variable. A race/ethnicity variable was created. Youth who identify with only one race were placed into that race/ethnicity group and youth with more than one race/ ethnicity were recoded as "multi-ethnic."

From a review of the existing literature on youth risk behaviors and from reviewing the Oregon YRBS questionnaire, risk behavior variables for analysis were selected in the following domains: alcohol and substance use, sexual behavior, disordered eating, unintentional injury potential, violent behavior, and suicidal behavior. The individual risk behavior variables were dichotomized (not at risk/ at risk) and a composite variable was created for each domain. Table 1 shows a summary of dichotomized variables and a summary of the composite variables is listed in Table 2.

For the initial assessment of substance use the following variables were created. Current (prior 30 days) cigarette smoking, alcohol use, and marijuana use were dichotomized into "no" or "yes" variables. Lifetime use of inhalants was dichotomized into "never" or "ever." The lifetime use of individual illicit drugs (cocaine, heroin, methamphetamines) was collapsed into one variable. Use of each drug was recoded into "never" or "ever" and a new dichotomous variable created for any illicit drug use. For the composite domain variable, new variables were created for cigarette smoking, alcohol use, marijuana use and inhalant use: "never" or "former" (use, but not in the prior 30 days) or "current" (use in the prior 30 days). Youth were considered to be at low risk if they reported only former cigarette or alcohol use; medium risk if they reported current cigarette or alcohol use, or former marijuana or inhalant use; high risk if they reported current marijuana or inhalant use, or ever using illicit drugs; no risk, if they did not report any of the above substance use behaviors.

Sexual behavior was first assessed by creating a dichotomous variable indicating whether a respondent has ever had sexual intercourse, "no" or "yes." For youth who reported having had sexual intercourse four additional variables were analyzed. Age at first intercourse was dichotomized into "12 or younger" or "13 and older." Responses for multiple lifetime sexual partners were dichotomized into "one" or "two or more." Use of alcohol or drugs before last sexual intercourse was recoded as "no" or "yes." Birth control method at last sexual intercourse was collapsed into "effective" (condom use, birth control pills or depo provera) or "ineffective" (no method or withdrawal). Risk for the composite sexual behavior domain variable was determined to be medium if youth reported having sex, but none of the other risk factors such as young age at first sexual intercourse, multiple lifetime sexual partners, substance use at last sex, and ineffective birth control method. Risk was determined to be high if youth reported having

sex and *any* of the other risk factors, and none if a youth reported never having had sexual intercourse.

The domain of disordered eating involved three variables: not eating for 24 or more hours to lose weight; taking diet pills, powders or liquids without a doctor's advice; and vomiting or taking laxatives. The time period for each variable was in the prior 30 days. Each variable was dichotomized into a "no" or "yes" variable. For the disordered eating domain composite variable, youth were considered at risk if they reported any of the disordered eating behaviors, and not at risk if they reported none of the behaviors.

In the unintentional injury domain the variables were recoded to: wears seatbelt as a passenger "most of the time or always" or "sometimes, rarely, never," drink and drive in the prior 30 days "no" or "yes"; rode in a vehicle driven by someone drinking in the prior 30 days "no" or "yes." In the composite unintentional injury variable, an individual was characterized at risk for unintentional injury if he or she reported any (versus none) of the behaviors as listed above.

The domain of violent behavior was represented by weapon carrying in the prior 30 days and being in a physical fight in the prior 12 months. Both variables were dichotomized for "no" or "yes" participating in the violent behavior. A composite violent behavior domain variable was created as "no risk" or "ever carried a weapon or been in a physical fight."

Two questions were used to assess suicidal behavior. The question of seriously considering suicide (suicidal ideation) in the prior 12 months was already a dichotomous variable. Suicide attempts in the prior 12 months was recoded into "no" or "yes." A composite ordinal variable was created for suicidal behavior with categories "no risk", "suicidal ideation" and "suicide attempt."

Variables were created for physical and sexual abuse. A dichotomous "no" or "yes" physical abuse variable was created based upon reports of being hit, slapped, or physically hurt by a boy/girlfriend or adult family member in the prior 12 months. Sexual abuse was also dichotomized as "never" or "ever" being forced to have sexual intercourse or unwanted sexual touching.

The YRBS contains a limited number of questions concerning protective factors for youth, however four questions that may be considered protective factors or assets include: eating meals with your family; having a caring adult to turn to; participating on a sports team; time spent in volunteer work, religious activities, youth groups and school activities. The current variables were recoded as eating with your family "zero to 2 times" or "3 or more times" in the past seven days; having a caring adult "absent" or "present" in your life; participating on "none" or "any" sports team; spending "none" or "any" time in community and school activities.

Table 1. Coding of risk behavior, and risk and protective factor variables from the 1999 Oregon YRBS

Variables	Referent Group (0)	Comparison Group (1)
Substance Use		
Smoked cigarettes (prior 30 days)	No	Yes
Alcohol use (prior 30 days)	No	Yes
Marijuana use (prior 30 days)	No	Yes
Inhalant use (lifetime)	Never	Ever
Illicit drug use (lifetime) (cocaine, heroin, methamphetamines)	Never	Ever
Sexual Behavior		
Ever had sexual intercourse	No	Yes
Among youth who have had sexual intercourse		
First sexual intercourse at 12 or younger	No	Yes
Multiple lifetime sexual partners	No	Yes
Alcohol or drug use before last sexual intercourse	No	Yes
Used ineffective birth control method at last sexual intercourse	No	Yes
Disordered Eating		
Fast for 24+ hours (prior 30 days)	No	Yes
Use diet pills, powders, liquids without doctor's advise (prior 30 days)	No	Yes
Vomit or take laxative (prior 30 days)	No	Yes
Unintentional Injury Potential		
Inadequate seatbelt use	No	Yes
Rode in car driven by someone who as been drinking alcohol (prior 30 days)	No	Yes
Drank alcohol and drove (prior 30 days)	No	Yes
Violent Behavior		
Carried a weapon (prior 30 days)	No	Yes
In a physical fight (prior 12 months)	No	Yes
Suicidal Behavior		
Seriously considered suicide (prior 12 months)	No	Yes
Attempted suicide (prior 12 months)	No	Yes
Physical and Sexual Abuse		
Physical abuse: been hit, slapped, physically hurt by boy/girlfriend or adult family member (prior 12 months)	No	Yes
Sexual abuse: ever been forced to have sexual intercourse or unwanted sexual contact	Never	Ever
Protective Factors		
Have a caring adult to talk to	Yes	No
Involved in school or community activities (prior 30 days)	Yes	No
Participated on a sports team (prior 12 months)	Yes	No
Family meals at least 3 times in last week	Yes	No

Table 2. Description of composite risk domain variables

Substance Use	
Low Risk	Former cigarette or alcohol use (not in the prior 30 days)
Medium Risk	Current cigarette or alcohol use, or former marijuana or inhalant use
High Risk	Current marijuana or inhalant use, or ever using illicit drugs
No Risk	None of the above
Sexual Behavior	
Medium Risk	Has had sexual intercourse and was 13 or older at the first time, and one lifetime sexual partner, and no alcohol or drug use before last sexual intercourse, and used effective birth control method at last sexual intercourse
High Risk	Has had sexual intercourse and was 12 or younger at the first time, or has more than one lifetime sexual partner, or alcohol or drug use before last sexual intercourse, or ineffective birth control method at last sexual intercourse
No Risk	Never has had sexual intercourse
Disordered Eating	
Risk	Fast for 24+ hours (prior 30 days), or Use diet pills, powders, liquids without doctor's advise (prior 30 days), or Vomit or take laxative (prior 30 days)
No Risk	None of the above
Unintentional Injury Potential	
Risk	Seatbelt use sometimes, rarely, never, or Drank alcohol and drove (prior 30 days), or Rode in car driven by someone who has been drinking alcohol (prior 30 days)
No Risk	None of the above
Violent Behavior	
Risk	Carried a weapon (prior 30 days), or In a physical fight (prior 12 months)
No Risk	None of the above
Suicidal Behavior	
Medium Risk	Seriously considered suicide (prior 12 months)
High Risk	Attempted suicide (prior 12 months)
No Risk	None of the above

Statistical Analysis

Data analysis was conducted using SPSS 10.0 for Windows. Initial data analysis included cross-tabulating gender, age and race for youth with chronic health conditions. Differences in demographics between chronic health conditions categories were assessed using the chi-square test of independence.

Based upon an exploratory analysis of the frequency distributions of the variables of interest, variables were recoded and new variables created as detailed above. Chronic health conditions were cross-tabulated with each risk behavior and each protective factor variable, and Pearson's chi-square test statistic computed. Due to gender differences in demographics, chronic health conditions and risk variables, all subsequent analyses were stratified by gender. Univariate logistic regression models were fit with risk behavior variables as the dependent variable. The estimated odds ratios were compared for the different health condition groupings using "no health condition" as the reference category.

Six multiple logistic regression models were used to identify risk behaviors associated with the presence of health conditions in youth. The dependent variables were the six composite domain variables as described above. Binary logistic regression was used for dichotomous domain variables and multinomial logistic regression was used for ordinal domain variables. With binary logistic regression the comparison was between the two possible outcomes of the dependent variable. With multinomial logistic regression involving, for instance, three outcomes: A, B and C, the coefficients (odds ratios) are estimated to compare A (the referent category) and B, and also A and C. While two separate binary logistic regressions could be used to estimate coefficients, multinomial logistic regression takes into consideration the number of categories in the dependent variable. Test statistics for independent variables in multinomial

models are based on the appropriate degrees of freedom. To control for their effects, race and age were included in each regression model. For all models, reference categories were "no health condition" for the chronic health condition variable, "13 and 14 years old" for the age variable, and "Caucasian" for the race variable. For all dependent domain variables, the reference category was "no risk." The next step was to add protective factors into each model to ascertain their effects upon the relationship between chronic health conditions and risk behavior domains. Next physical and sexual abuse were included. Finally, among youth who identify as having a chronic health condition, the above data description and analyses were performed to see if differences exist where a limitation of activity, due to a chronic health condition, was present. Due to the number of youth identifying with a chronic health condition, 99% confidence intervals (CI) were calculated for all parametric estimates in univariate and multiple logistic models.

Results

Of the 19,202 valid survey responses, 6087 youth (31.7%) identified as having at least one health condition (chronic medical, emotional or learning) [Table 3]. Medical conditions were the most prevalent, followed by emotional then learning conditions. Youth were able to choose more than one condition type, and 4.5% of youth (864) reported multiple conditions. When youth reporting multiple conditions were placed into a separate category, 17.5% of youth (3355) reported chronic medical conditions only, 5.9% reported emotional conditions only (1138), and 3.8% reported learning conditions only (730). Youth with emotional or learning conditions were more likely to report multiple conditions than youth with medical conditions. Of the youth reporting medical conditions, approximately 18% also reported another condition (emotional or learning). This was significantly less than the one-third of youth reporting

emotional or learning conditions (36.7% and 38% respectively) who also reported another condition. Of the 4.5% of youth identifying with more than one type of condition, 85.3% reported having a medical condition, 79.1% reported having an emotional condition, and 49.2% reported having a learning condition.

Table 3. Frequency and proportion of Oregon public high school students who report being diagnosed with a chronic health condition, 1999 Oregon YRBS.

	Youth identifying with given condition (respondents can check more than one category)	
	n	%
No condition	13,115	68.3
A medical condition which has lasted over a year (asthma, arthritis, cancer, diabetes, health problems, seizures, hearing or vision problems other than glasses or contacts, etc)	4092	21.3
Depression, problems with anxiety or fearfulness, or an eating disorder (anorexia or bulimia)	1821	9.5
A learning disorder, attention deficit disorder or ADHD	1155	6.0

Distribution of gender, age, and race across chronic health condition groups varied significantly (all $p<0.0001$) [Table 4]. Youth identifying with chronic medical conditions were slightly more likely to be female than male (OR for male =0.887, 99%CI 0.803, 0.980). The gender difference was even more pronounced among youth identifying with emotional (OR for male =0.446, 99%CI 0.376, 0.529) or multiple conditions (OR for male =0.511, 99%CI 0.422, 0.618) with approximately half as many males as females. Conversely, youth with learning conditions were more than twice as likely to be male than female (OR for male =2.399, 99%CI 1.937, 2.972).

Table 4. Proportion of demographic characteristics of Oregon public high school students by chronic health condition, 1999 Oregon YRBS.

	None n=13115 %	Medical n=3355 %	Emotional n=1138 %	Learning n=730 %	Multiple n=864 %
Gender*					
Female	49.9	52.9	69.1	29.3	66.1
Male	50.1	47.1	30.9	70.7	33.9
Age*					
13 -14 years	7.9	9.0	7.3	7.1	7.3
15 years	27.4	30.0	25.0	30.0	23.7
16 years	28.4	27.7	30.2	29.7	31.3
17 years	25.0	23.6	25.3	20.1	25.7
18+ years	11.3	9.7	12.2	13.0	12.0
Race*					
White	84.4	84.0	84.0	88.9	85.6
Am. Indian/ AK Native	2.0	2.3	3.1	2.2	2.8
Asian	2.8	2.1	1.9	0.7	1.2
African Am.	1.0	1.4	1.5	1.5	0.2
Hisp/Latino	5.4	4.5	4.5	3.2	2.7
Pacific Is.	1.0	1.3	0.8	0.3	0.2
Multi-racial	3.3	4.4	4.2	3.3	7.3

* all $p < 0.0001$

Of youth identifying with chronic health conditions, 8.8% overall reported a limitation in activity due to their condition [Table 5]. There were differences between the three categories of chronic health conditions, however of youth identifying with a chronic health condition, 10.3% reported limitations in going to school or doing regular school work; 16.1% reported limits in ability to do strenuous activities such as running, swimming, or other sports; 4.8% reported limits in ability to make friends; and 1.4% reported difficulty with personal care such as bathing, dressing, eating or using the toilet.

Within the different health condition groups there were variations in limitation by gender. Within the chronic medical condition group, youth reporting any limitation were more likely to be female (OR for limitations reported by males=0.593, 99%CI 0.503, 0.699) than youth reporting no limitations. Within the emotional condition group, youth with any limitation were

more likely to be male than female (OR=1.806, 99%CI 1.384, 2.356) as compared to youth reporting no limitations. Youth in the learning condition group who reported any limitation were also more likely to be male than female (OR=1.157, 99%CI 0.792, 1.690) although the association between gender and limitation was not significant as determined by the Pearson's chi-square statistic. Among youth reporting multiple conditions, limitations were more likely to be reported by females than males (OR for limitations reported by males=0.671, 99%CI 0.501, 0.898)

Table 5. Proportion of youth reporting condition related limitation in activity by chronic health condition

	Medical condition only %	Emotional condition only %	Learning condition only %	Multiple conditions %
Any limitation	23.6	32.0	24.9	42.6
Going to school/school work	3.8	17.6	17.3	20.2
Strenuous activities	19.2	9.8	4.3	22.5
Making friends	1.6	9.2	4.9	11.2
Personal care	0.7	2.3	1.1	2.8

Univariate Results

Pearson's chi-square test of independence by gender showed that chronic health conditions were significantly associated ($p < 0.0001$) with all risk behavior and risk and protective factor variables, except the following: ever had sex, < 12 at first sex, community/school involvement among males, and multiple sex partners and substance use with last sex among females. Proportions of reported risk behaviors and risk and protective factors by chronic health condition are presented in Table 6. A summary of the estimated odds ratios and 99% confidence intervals are shown in Appendix B.

Youth having chronic medical conditions were significantly more likely than youth having no chronic health conditions to report lifetime inhalant use (OR for females =1.234,

99%CI 1.005, 1.517; OR for males =1.371, 99%CI 1.097, 1.713); having been 12 years old or younger the first time they had sexual intercourse (OR for females =1.963, 99%CI 1.393, 2.766; OR for males =1.435, 99%CI 1.097, 1.879); trying to control their weight by fasting for 24 or more hours (OR for females =1.536, 99%CI 1.329, 1.776; OR for males =2.070, 99%CI 1.588, 2.697); using diet pills, powders or liquid not under the advice of a doctor (OR for females = 1.413, 99%CI 1.172, 1.703; OR for males =2.521, 99%CI 1.763, 3.604); carrying a weapon (OR for females 1.656, 99%CI 1.210, 2.267; OR for males =1.205, 99%CI 1.018, 1.426); being in a physical fight (OR for females =1.582, 99%CI 1.309, 1.910; OR for males =1.309, 99%CI 1.123, 1.525); suicidal ideation (OR for females 1.609, 99%CI 1.350, 2.068, OR for males =1.643, 99%CI 1.305, 2.068); and suicidal attempts (OR for females 1.641, 99%CI 1.238, 2174, OR for males =1.927, 99%CI 1.236, 3.005). Females with chronic medical conditions were also significantly more likely to report lifetime illicit drug use (OR=1.333, 99%CI 1.318, 1.347). Males with chronic medical conditions were significantly more likely to report trying to control weight by vomiting or using laxatives (OR=5.135, 99%CI 2.981, 8.844) and riding in a car with someone who was drinking and driving (OR=1.238, 99%CI 1.050, 1.459). Both males and females with chronic medical conditions were more likely to report physical abuse (OR=1.467 and OR=1.343 respectively) and sexual abuse (OR=1.377 and OR=1.514 respectively). For females there was no statistical difference in reporting protective factors, although males reported fewer protective factors (a caring adult (OR=0.727, 99%CI 0.633, 0.835), participating in sports teams (OR=0.762, 99%CI 0.679, 0.854) and family meals (OR=0.808, 99%CI 0.711, 0.919)).

Youth reporting emotional conditions were significantly more likely than youth without chronic health conditions to report engaging in all risk behaviors, except for ineffective birth

control method and, for males, substance use before last sexual intercourse. Males and females with emotional conditions were more than twice as likely as their peers to report current cigarette smoking, current marijuana use, and lifetime inhalant or illicit drug use (odds ratios ranged from 2.342 for females currently using marijuana to 4.100 for males ever using illicit drugs). Youth with emotional conditions were almost three times as likely to reporting ever having had sexual intercourse (OR for females =2.837, 99%CI 2.437, 3.304; OR for males =3.007, 99%CI 2.404, 3.762). Both males and females were approximately two and a half times more likely to report carrying a weapon (OR=2.479 and OR=2.410 respectively), and almost three times as likely to report being in a physical fight (OR=2.949 and OR=2.917 respectively). The association with suicidal behavior was high among youth with emotional conditions; females were more than eight times more likely to report attempting suicide (OR=8.406, 99%CI 6.502, 10.867) and males more than 12 times as likely (OR=12.159, 99%CI 7.728, 19.130). Due to the inclusion of eating disorders in the definition of emotional conditions, data on disordered eating variables for the emotional condition and multiple condition groups were not reported. Youth with emotional conditions were also significantly more likely to report physical (OR for females =2.922, OR for males =3.057) or sexual abuse (OR for females =3.417, OR for males =3.785), and fewer protective factors.

Youth with learning conditions reported similar rates of engagement in all risk behaviors compared to their peers. Youth with learning conditions were significantly more likely to report current cigarette use, current marijuana use, lifetime illicit drug use, use of diet pills or powders (OR for females =1.917, 99%CI 1.258, 2.372; OR for males=2.176, 99%CI 1.226, 3.862) having been in a physical fight (OR for females=1.719, 99%CI 1.082, 2.730; OR for males=1.899, 99%CI 1.494, 2.414), and having made a suicide attempt (OR for females=2.633, 99%CI 1.457,

4.757; OR for males=2.837, 99%CI 1.569, 5.131). For substance use, aside from alcohol use which was not significantly different, youth with learning conditions were approximately 50% more likely to report use of any of substance (odds ratios ranged from 1.443 for males currently smoking cigarettes to 1.842 for females currently smoking cigarettes). Males with learning conditions were more likely to report lifetime inhalant use, ever having had sex (OR=1.530, 99%CI 1.271, 1.843), being 12 years old or younger at first sexual intercourse, vomiting or using laxatives (OR=4.909, 99%CI 2.270, 10.618), riding with someone who is drinking and driving, carrying a weapon, and suicidal ideation (OR=2.288, 99%CI 1.646, 3.180). Females with learning conditions were more likely to report fasting for 24 or more hours (OR=1.882, 99%CI 1.336, 2.652) and infrequent seatbelt use (OR=1.894, 99%CI 1.089, 3.294). Both genders were significantly more likely to report physical and sexual abuse. Protective factors were less prevalent among youth with learning conditions; females were significantly less likely to report community or school activities (OR=0.642, 99%CI 0.482, 0.854), and males were significantly less likely to report a caring adult (OR=0.706, 99%CI 0.565, 0.882) or involvement in team sports (OR=0.649, 99%CI 0.541, 0.780).

Engagement in all risk behaviors was significantly greater among youth reporting multiple conditions than among youth reporting no health condition, except ineffective birth control and substance use with last sexual intercourse. Youth with multiple conditions were also more likely to report physical or sexual abuse and having fewer protective factors (caring adult, family meals, and team sports). Females with multiple conditions were four times more likely to report physical (OR=4.138, 99%CI 3.270, 5.237) or sexual (OR=4.369, 99%CI 3.466, 5.507) abuse, and males were around three times as likely to report physical (OR= 3.016, 99%CI 2.151, 4.229) or sexual (OR=2.759, 99%CI 1.758, 4.331) abuse.

Table 6. Proportion and association of selected risk behaviors, and risk and protective factors by chronic health condition, as reported among Oregon public high school students, 1999 Oregon YRBS

	No condition %	Medical only %	Emotional only %	Learning only %	Multiple %
Substance Use					
Current cigarette smoking					
Female	22.3	23.9	**44.2**	**34.6**	**44.3**
Male	21.5	22.3	**45.3**	**28.4**	**34.3**
Current alcohol use					
Female	41.1	42.9	**60.2**	43.3	**57.9**
Male	43.2	44.4	**57.3**	46.5	**52.3**
Current marijuana use					
Female	17.0	18.4	**32.4**	**24.4**	**32.2**
Male	21.3	23.6	**39.9**	**27.6**	**30.2**
Ever inhalant use					
Female	11.2	**13.5**	**26.0**	16.4	**31.0**
Male	9.6	**12.7**	**23.6**	**15.5**	**25.7**
Ever illicit drug use					
Female	6.9	**9.0**	**22.3**	**11.8**	**25.5**
Male	7.5	9.0	**24.9**	**11.6**	**17.4**
Sexual Behavior					
Ever had sex					
Female	32.2	33.1	**57.3**	39.0	**58.2**
Male	31.8	34.2	**58.4**	**41.6**	**47.4**
Ineffective birth control					
Female	24.4	25.2	27.4	23.7	24.6
Male	20.3	22.7	26.7	23.0	21.4
< 12 when first had sex					
Female	5.0	**9.3**	**11.9**	6.3	**14.2**
Male	11.8	**16.1**	**24.4**	**18.8**	**23.4**
Multiple life sexual partners					
Female	51.6	56.7	**63.4**	50.6	**65.4**
Male	56.8	58.0	**67.7**	64.3	63.0
Substance use with last sex					
Female	20.8	24.5	**33.4**	20.7	24.8
Male	29.7	31.9	36.0	26.3	30.4
Disordered Eating					
Fast for 24+ hrs					
Female	11.8	**17.1**	-	**20.2**	-
Male	2.7	**5.5**	-	4.0	-
Diet pills, etc.					
Female	6.8	**9.3**	-	**12.3**	-
Male	1.3	**3.1**	-	**2.7**	-
Vomit or laxatives					
Female	4.7	5.7	-	6.5	-
Male	0.4	**1.9**	-	**1.8**	-

Referent group is no chronic health condition
Bold = significance <0.01 of estimated odds ratio as determined by the Wald test

Table 6 (cont). Proportion and association of selected risk behaviors, and risk and protective factors by chronic health condition, as reported among Oregon public high school students, 1999 Oregon YRBS

	No condition %	Medical only %	Emotional only %	Learning only %	Multiple %
Unintentional Injury					
Infrequent seatbelt use					
Female	6.8	8.2	**13.2**	**12.1**	**14.9**
Male	13.4	13.9	**25.1**	14.2	**18.8**
Drink and drive					
Female	6.7	7.8	**11.9**	5.2	**11.4**
Male	11.5	11.9	**22.0**	12.0	13.0
Ride with someone drinking					
Female	23.3	23.7	**37.7**	22.9	**37.3**
Male	23.4	**27.4**	**41.0**	**29.7**	28.6
Violent Behavior					
Carry a weapon					
Female	3.6	**5.8**	**8.2**	5.2	**12.2**
Male	22.8	**26.2**	**42.2**	**30.0**	**40.1**
In a physical fight					
Female	11.9	**17.5**	**28.4**	**18.8**	**36.0**
Male	29.7	**35.6**	**55.2**	**44.5**	**47.4**
Suicidal Behavior					
Considered suicide					
Female	14.2	**21.0**	**51.7**	19.2	**53.2**
Male	7.9	**12.3**	**36.6**	**16.3**	**35.3**
Suicide attempt					
Female	4.8	**7.6**	**29.7**	**11.7**	**31.0**
Male	1.8	**3.5**	**18.6**	**5.1**	**17.2**
Abuse					
Physical abuse					
Female	15.5	**21.2**	**34.9**	**24.5**	**43.1**
Male	13.3	**17.1**	**31.9**	**20.4**	**31.6**
Sexual abuse					
Female	24.7	**31.1**	**52.8**	**36.6**	**58.9**
Male	5.7	**8.4**	**18.7**	**11.1**	**14.4**
Protective Factors					
Caring adult					
Female	88.8	88.0	**83.1**	86.7	**81.4**
Male	83.5	**78.6**	**64.4**	**78.1**	**71.7**
Community/school activities					
Female	72.2	72.6	**65.2**	**62.5**	73.2
Male	56.2	58.8	61.4	55.9	59.8
Sports team					
Female	58.7	57.4	**45.6**	52.4	**49.2**
Male	68.1	**61.9**	**56.5**	**58.1**	**53.6**
Family meals					
Female	71.1	68.1	**57.7**	65.7	**56.0**
Male	78.4	**74.5**	**63.3**	74.9	**68.4**

Referent group is no chronic health condition
Bold = significance <0.01 of estimated odds ratio as determined by the Wald test

Multiple Logistic Regression

Each of the following tables contains three sections. This first set of columns show the estimated odds ratios and corresponding 99% confidence intervals with age and race included in the model. In the second set of columns protective factors have been added into the model. In the third set of columns, physical and sexual abuse have been added, so that this last model includes chronic health conditions, age and race, protective factors and abuse. In comparing the corresponding odds ratios across the different sections, one can determine the change in association between a chronic health condition and a risk behavior due to controlling for protective factors and physical and sexual abuse.

Substance Use

Youth with chronic health conditions were more likely to engage in substance use behaviors than youth without chronic health conditions [Table 7]. When adjusted for age and race, females with emotional or multiple conditions were more likely than females with no health conditions to report all risk levels of substance use. This association remained even when adjusted for protective factors and physical or sexual abuse. Females with chronic medical or learning conditions were more likely to report high risk substance use although neither remained statistically significant after adjusting for protective factors and physical or sexual abuse. Males with emotional conditions were more likely than youth without chronic health conditions to report medium risk and high risk substance use behaviors when adjusted for age and race. This association remained significant after adjustment for protective factors and physical or sexual abuse (OR for medium risk =2.093, 99%CI 1.248, 3.511; OR for high risk =4.492, 99%CI 2.532, 7.969). For males with chronic medical, learning or multiple conditions, a significant association was seen only for high risk substance use, which remained significant for learning and multiple

conditions (OR=1.624, 99%CI 1.020, 2.586 and OR=2.173, 99%CI 1.244, 3.797 respectively) after adjusting for protective factors and physical and sexual abuse.

Table 7. Odds ratios and 99% confidence intervals from multinomial logistic regression for determining association between chronic health conditions and substance use

	Substance Use (adjusted for age & race)			**Substance Use** (adjusted for age, race & protective factors)			**Substance Use** (adjusted for age, race, protective factors & abuse)		
	Low OR (99% CI)	Medium OR (99% CI)	High OR (99% CI)	Low OR (99% CI)	Medium OR (99% CI)	High OR (99% CI)	Low OR (99% CI)	Medium OR (99% CI)	High OR (99% CI)
Female									
Medical	1.186 (0.956, 1.471)	1.137 (0.950, 1.362)	***1.420 (1.092, 1.848)***	1.141 (0.912, 1.429)	1.100 (0.909, 1.331)	*1.355 (1.025, 1.792)*	1.112 (0.887, 1.396)	0.997 (0.819, 1.215)	1.147 (0.858, 1.534)
Emotional	***1.700 (1.128, 2.563)***	***3.165 (2.277, 4.399)***	***8.102 (5.614, 11.693)***	***1.713 (1.109, 2.646)***	***3.105 (2.178, 4.427)***	*7.142 (4.797, 10.632)*	*1.596 (1.028, 2.478)*	***2.342 (1.622, 3.382)***	***4.483 (2.952, 6.808)***
Learning	1.178 (0.612, 2.269)	1.663 (0.995, 2.777)	***2.706 (1.411, 5.188)***	1.159 (0.592, 2.271)	1.478 (0.859, 2.541)	*2.177 (1.086, 4.362)*	1.089 (0.549, 2.162)	1.292 (0.737, 2.264)	1.756 (0.851, 3.624)
Multiple	***2.171 (1.308, 3.604)***	***3.783 (2.480, 5.770)***	***11.638 (7.417, 18.261)***	***2.144 (1.254, 3.664)***	***3.724 (2.371, 5.847)***	***10.890 (6.690, 17.726)***	*1.908 (1.105, 3.294)*	***2.567 (1.606, 4.102)***	***5.853 (3.503, 9.779)***
Male									
Medical	1.066 (0.843, 1.348)	1.112 (0.918, 1.348)	***1.427 (1.084, 1.877)***	1.118 (0.876, 1.426)	1.154 (0.941, 1.415)	*1.409 (1.053, 1.885)*	1.116 (0.874, 1.425)	1.119 (0.911, 1.376)	1.298 (0.963, 1.750)
Emotional	1.392 (0.764, 2.538)	***2.309 (1.437, 3.709)***	***6.984 (4.196, 11.625)***	1.523 (0.812, 2.857)	***2.455 (1.473, 4.093)***	***6.133 (3.513, 10.708)***	1.413 (0.749, 2.667)	***2.093 (1.248, 3.511)***	***4.492 (2.532, 7.969)***
Learning	1.144 (0.771, 1.696)	1.229 (0.891, 1.697)	***2.019 (1.328, 3.068)***	1.234 (0.821, 1.853)	1.266 (0.899, 1.782)	***1.879 (1.198, 2.945)***	1.240 (0.823, 1.869)	1.202 (0.848, 1.705)	*1.624 (1.020, 2.586)*
Multiple	0.996 (0.566, 1.750)	1.422 (0.922, 2.192)	***3.339 (2.019, 5.522)***	0.919 (0.504, 1.675)	1.463 (0.930, 2.303)	***2.859 (1.668, 4.899)***	0.860 (0.467, 1.584)	1.274 90.801, 2.025)	***2.173 (1.244, 3.797)***

Referent group is no chronic health condition

Italics = significance <0.01, ***bold italics = significance <0.001***

Sexual Behavior

While females with medical and learning conditions reported similar engagement in sexual behaviors compared to females with no chronic health conditions, the association was not significant when adjusted for age and race, nor did it become so when adjusted for protective factors and physical or sexual abuse [Table 8]. Females with emotional conditions were more likely to report risky sexual behavior, and this remained significant (OR for medium risk =1.638, 99%CI 1.259, 2.131; OR for high risk = 2.067, 99%CI 1.707, 2.504) after adjustment for protective factors and physical or sexual abuse. Females with multiple conditions were more likely to report risky sexual behavior when adjusted for age and race. However only the association with high risk behavior remained (OR =1.977, 99%CI 1.578, 2.476) after adjustment for protective and physical or sexual abuse.

Males with chronic medical conditions had an association with high risk sexual behavior, however after adjustment for protective factors and physical or sexual abuse, this relationship was no longer significant. Emotional conditions were associated with medium and high risk sexual behaviors, although only high risk behaviors remained significant (OR=2.328, 99%CI 1.778, 3.047) after adjustment for protective factors and physical or sexual abuse. Learning and multiple conditions were significantly associated with high risk sexual behavior, and the relationship remained (OR=1.693, 99%CI 1.353, 2.119 and OR=1.733, 99%CI 1.300, 2.309 respectively) after adjusting for protective factors and physical or sexual abuse.

Table 8. Odds ratios and 99% confidence intervals from multinomial logistic regression for determining association between chronic health conditions and sexual behavior

	Sexual Behavior (adjusted for age & race)		**Sexual Behavior** (adjusted for age, race & protective factors)		**Sexual Behavior** (adjusted for age, race, protective factors & abuse)	
	Medium OR (99% CI)	High OR (99% CI)	Medium OR (99% CI)	High OR (99% CI)	Medium OR (99% CI)	High OR (99% CI)
Female						
Medical	0.887 (0.731, 1.077)	1.139 (0.999, 1.299)	0.859 (0.702, 1.051)	1.110 (0.965, 1.277)	0.821 (0.670, 1.007)	0.982 (0.847, 1.137)
Emotional	***1.997*** ***(1.556, 2.563)***	***3.391*** ***(2.862, 4.017)***	***1.931*** ***(1.494, 2.496)***	***2.959*** ***(2.471, 3.545)***	***1.638*** ***(1.259, 2.131)***	***2.067*** ***(1.707, 2.504)***
Learning	1.368 (0.871, 2.149)	1.389 (0.995, 1.939)	1.186 (0.739, 1.902)	1.126 (0.789, 1.607)	1.118 (0.696, 1.795)	0.942 (0.648, 1.369)
Multiple	***1.895*** ***(1.413, 2.541)***	***3.388*** ***(2.785, 4.121)***	***1.864*** ***(1.367, 2.541)***	***3.258*** ***(2.638, 4.025)***	1.506 (1.097, 2.068)	***1.977*** ***(1.578, 2.476)***
Male						
Medical	1.018 (0.822, 1.261)	*1.219* *(1.066, 1.395)*	1.042 (0.835, 1.300)	*1.212* *(1.052, 1.397)*	1.015 (0.812, 1.269)	1.155 (0.998, 1.336)
Emotional	*1.834* *(1.230, 2.736)*	***3.268*** ***(2.565, 4.165)***	*1.868* *(1.238, 2.817)*	***2.841*** ***(2.191, 3.683)***	1.710 (1.130, 2.588)	***2.328*** ***(1.778, 3.047)***
Learning	1.144 (0.803, 1.630)	***1.817*** ***(1.478, 2.234)***	1.159 (0.800, 1.679)	***1.856*** ***(1.493, 2.307)***	1.095 (0.752, 1.596)	***1.693*** ***(1.353, 2.119)***
Multiple	1.610 (1.065, 2.433)	***2.144*** ***(1.646, 2.793)***	1.558 (1.007, 2.412)	***2.063*** ***(1.562, 2.726)***	1.426 (0.918, 2.214)	***1.733*** ***(1.300, 2.309)***

Referent group is no chronic health condition
Italics = significance <0.01, ***bold italics = significance <0.001***

Disordered Eating

Disordered eating was associated with both medical and learning conditions [Table 9]. When adjusted for age and race, both females and males with chronic medical conditions showed an association with disordered eating. This relationship remained (OR for females =1.293, 99%CI 1.081, 1.547; OR for males =1.781, 99%CI 1.291, 2.456) after adjustment for protective factors and physical or sexual abuse. Disordered eating behaviors were also associated with learning conditions among females and males, however after adjustment for protective factors and physical or sexual abuse, the association was no longer statistically significant.

Table 9. Odds ratios and 99% confidence intervals from binary logistic regression for determining association between chronic health conditions and disordered eating

	Disordered Eating (adjusted for age & race) OR (99% CI)	**Disordered Eating** (adjusted for age, race & protective factors) OR (99% CI)	**Disordered Eating** (adjusted for age, race, protective factors & abuse) OR (99% CI)
Female			
Medical	***1.412 (1.193, 1.671)***	***1.390 (1.167, 1.657)***	***1.293 (1.081, 1.547)***
Emotional	-	-	-
Learning	***1.619 (1.070, 2.449)***	***1.558 (1.014, 2.394)***	1.401 (0.902, 2.175)
Multiple	-	-	-
Male			
Medical	***2.012 (1.487, 2.722)***	***1.874 (1.365, 2.572)***	***1.781 (1.291, 2.456)***
Emotional	-	-	-
Learning	*1.829 (1.115, 3.002)*	*1.748 (1.037, 2.946)*	1.590 (0.933, 2.711)
Multiple	-	-	-

Referent group is no chronic health condition
Italics = significance <0.01, ***bold italics = significance <0.001***

Unintentional Injury Potential

The presence of medical or learning conditions among females was not associated with unintentional injury potential [Table 10]. For females with emotional or multiple conditions, a statistically significant association was found with unintentional injuries; this risk remained (OR=1.599, 99%CI 1.286, 1.987 and OR 1.526, 99%CI 1.181, 1.971 respectively) after adjustment for protective factors and physical or sexual abuse. For males there was an association between chronic medical or multiple conditions and the risk for unintentional injuries when adjusted for age and race, however these associations were no longer significant after adjustment for protective factors and physical or sexual abuse. The association between emotional conditions and unintentional injuries for males remained significant under all circumstances; odds ratio of 1.822 (99%CI 1.331, 2.495) after adjustment for protective factors and abuse.

Table 10. Odds ratios and 99% confidence intervals from binary logistic regression for determining association between chronic health conditions and unintentional injury potential

	Unintentional Injury Potential (adjusted for age & race) OR (99% CI)	**Unintentional Injury Potential** (adjusted for age, race & protective factors) OR (99% CI)	**Unintentional Injury Potential** (adjusted for age, race, protective factors & abuse) OR (99% CI)
Female			
Medical	1.083 (0.930, 1.260)	1.061 (0.905, 1.244)	1.000 (0.850, 1.176)
Emotional	***2.164 (1.775, 2.639)***	***1.977 (1.603, 2.437)***	***1.599 (1.286, 1.987)***
Learning	1.234 (0.841, 1.811)	1.102 (0.735, 1.650)	0.991 (0.655, 1.500)
Multiple	***2.099 (1.668, 2.642)***	***2.008 (1.570, 2.567)***	***1.526 (1.181, 1.971)***
Male			
Medical	*1.180 (1.013, 1.374)*	*1.181 (1.005, 1.387)*	1.137 (0.966, 1.339)
Emotional	***2.132 (1.600, 2.840)***	***2.049 (1.508, 2.784)***	***1.822 (1.331, 2.495)***
Learning	1.243 (0.970, 1.591)	1.150 (0.884, 1.497)	1.090 (0.834, 1.425)
Multiple	*1.390 (1.012, 1.908)*	1.277 (0.911, 1.789)	1.142 (0.810, 1.610)

Referent group is no chronic health condition
Italics = significance <0.01, ***bold italics = significance <0.001***

Violent Behavior

Among females with chronic medical, emotional or multiple conditions a significant association was found for risk of violent behavior [Table 11]. This relationship remained after adjustment for protective factors and physical or sexual abuse (OR for chronic medical conditions =1.451, 99%CI 1.197, 1.760; OR for emotional conditions =1.823, 99%CI 1.424, 2.334; OR for multiple conditions =2.323, 99%CI 1.760, 3.065). The association between learning conditions and violent behavior, while present, did not remain statistically significant after adjustment for protective factors and physical or sexual abuse. Among males with any of the health conditions, a significant association was found with violent behavior regardless of adjustments for protective factors and physical or sexual abuse (OR for chronic medical conditions =1.183, 99%CI 1.010, 1.385; OR for emotional conditions =2.224, 99%CI 1.598, 3.095; OR for learning conditions =1.565, 99%CI 1.208, 2.028; OR for multiple conditions =1.682, 99%CI 1.189, 2.381).

Table 11. Odds ratios and 99% confidence intervals from binary logistic regression for determining association between chronic health conditions and violent behavior

	Violent Behavior (adjusted for age & race) OR (99% CI)	**Violent Behavior** (adjusted for age, race & protective factors) OR (99% CI)	**Violent behavior** (adjusted for age, race, protective factors & abuse) OR (99% CI)
Female			
Medical	***1.580 (1.322, 1.888)***	***1.574 (1.308, 1.894)***	***1.451 (1.197, 1.760)***
Emotional	***2.852 (2.286, 3.558)***	***2.510 (1.990, 3.167)***	***1.823 (1.424, 2.334)***
Learning	*1.726 (1.111, 2.682)*	*1.614 (1.020, 2.555)*	1.367 (0.844, 2.216)
Multiple	***4.049 (3.174, 5.164)***	***3.588 (2.768, 4.651)***	***2.323 (1.760, 3.065)***
Male			
Medical	***1.261 (1.088, 1.462)***	***1.239 (1.062, 1.446)***	*1.183 (1.010, 1.385)*
Emotional	***2.885 (2.125, 3.916)***	***2.635 (1.916, 3.623)***	***2.224 (1.598, 3.095)***
Learning	***1.746 (1.372, 2.222)***	***1.690 (1.314, 2.173)***	***1.565 (1.208, 2.028)***
Multiple	***2.009 (1.460, 2.766)***	***2.014 (1.440, 2.816)***	***1.682 (1.189, 2.381)***

Referent group is no chronic health condition
Italics = significance <0.01, ***bold italics = significance <0.001***

Suicidal Behavior

For both genders, youth with chronic medical, emotional or multiple conditions were at greater risk for suicidal behavior than youth without chronic health conditions [Table 12]. This relationship remained after adjustment for protective factors and physical or sexual abuse (for females: OR for chronic medical conditions =1.542, OR for emotional conditions =7.818, OR for multiple conditions =7.177; for males: OR for chronic medical conditions =1.682, OR for emotional conditions =9.238, OR for multiple conditions =8.998). Among youth reporting learning conditions, females were more likely than those without health conditions to report high risk suicidal behavior however this did not remain significant after adjustment for protective factors. Males with learning conditions were more likely to report medium or high risk suicidal behavior, although only high risk remained significant (OR=2.589, 99%CI 1.379, 4.860) after adjustment for protective factors and physical or sexual abuse.

Table 12. Odds ratios and 99% confidence intervals from multinomial logistic regression for determining association between chronic health conditions and suicidal behavior

	Suicidal Behavior (adjusted for age & race)		**Suicidal Behavior** (adjusted for age, race & protective factors)		**Suicidal Behavior** (adjusted for age, race, protective factors & abuse)	
	Medium OR (99% CI)	High OR (99% CI)	Medium OR (99% CI)	High OR (99% CI)	Medium OR (99% CI)	High OR (99% CI)
Female						
Medical	***1.582 (1.274, 1.964)***	***1.693 (1.273, 2.252)***	***1.606 (1.283, 2.011)***	***1.723 (1.281, 2.316)***	***1.515 (1.205, 1.904)***	***1.542 (1.136, 2.093)***
Emotional	***4.501 (3.451, 5.870)***	***11.933 (9.077, 15.687)***	***4.117 (3.115, 5.441)***	***10.760 (8.080, 14.329)***	***3.468 (2.604, 4.619)***	***7.818 (5.783, 10.570)***
Learning	0.930 (0.468, 1.848)	***2.591 (1.417, 4.740)***	0.911 (0.455, 1.825)	1.834 (0.929, 3.622)	0.830 (0.410, 1.678)	1.527 (0.753, 3.096)
Multiple	***4.421 (3.252, 6.010)***	***13.014 9.592, 17.656)***	***4.272 (3.098, 5.890)***	***11.467 (8.275, 15.888)***	***3.233 (2.319, 4.508)***	***7.177 (5.086, 10.128)***
Male						
Medical	***1.686 (1.282, 2.218)***	***1.973 (1.262, 3.084)***	***1.642 (1.237, 2.180)***	*1.765 (1.102, 2.827)*	***1.566 (1.173, 2.089)***	*1.682 (1.044, 2.712)*
Emotional	***5.296 (3.533, 7.939)***	***15.511 (9.723, 24.747)***	***4.850 (3.184, 7.386)***	***11.845 (7.168, 19.573)***	***4.116 (2.668, 6.349)***	***9.238 (5.470, 15.601)***
Learning	***1.895 (1.246, 2.880)***	***3.039 (1.672, 5.521)***	*1.654 (1.056, 2.590)*	***2.940 (1.586, 5.452)***	1.547 (0.982, 2.437)	***2.589 (1.379, 4.860)***
Multiple	***4.509 (2.922, 6.957)***	***13.631 (8.351, 22.248)***	***3.908 (2.475, 6.170)***	***11.082 (6.555, 18.735)***	***3.338 (2.088, 5.337)***	***8.998 (5.237, 15.460)***

Referent group is no chronic health condition
Italics = significance <0.01, ***bold italics = significance <0.001***

Protective Factors

Controlling for protective factors did not significantly affect the magnitude of the association between chronic health conditions and risk behaviors, although youth who reported participation in each risk behavior domain were less likely to report protective factors. Youth who reported participating in any of the risk behavior domains were less likely to report frequent family meals; this relationship was significant except for violent behavior among males. Adolescents reporting engagement in most risk behaviors (violence, unintentional injury potential, suicidal behavior, and substance use) were also less likely to report the presence of a caring adult. For sexual behavior, the only significant association was seen among males reporting high risk sexual behavior and less presence of a caring adult.

The participation in sports teams was overall not significant in its association with many risk behaviors. However, females reporting suicidal behavior, high risk sexual behavior and high risk substance use were less likely to report participating in team sports. Conversely, among males, team sports participation was positively associated with medium risk sexual behavior. It was also positively associated with low and medium risk substance use. Involvement in community or school activities was significantly lower in youth participating in risk behaviors except among males for disordered eating and suicidal behavior and among females for medium risk suicidal behavior.

Physical and sexual abuse

Youth who reported engaging in risk behaviors, except males reporting low risk substance use, were more likely to report physical or sexual abuse. Controlling for physical and sexual abuse decreased the magnitude of the association between chronic health conditions and risk behaviors. In some cases the relationship was no longer significant.

Condition Related Activity Limitations

The presence of condition related activity limitations was added to the above multivariate logistic regression models. The presence of activity limitations was associated with some risk behaviors. A summary of the multiple logistic regression models are listed in Appendix C.

For substance use among females, condition related limitations were negatively associated with risk behavior. Females were less likely to report a condition related limitation if they engaged in substance use behaviors. This association was only significant for the lowest risk category (former cigarette or alcohol use). Among males, condition related limitations were positively associated with substance use. This association did not remain significant after

adjustment for protective factors and physical or sexual abuse. Adjusting for limitations (and controlling for race, age, protective factors and physical or sexual abuse) did not change the statistical significance between chronic medical or multiple conditions and substance use. However, the association between learning conditions among males and substance use was not significant after controlling for limitations.

In the domain of disordered eating behaviors the presence of limitations was positively associated among males; males reporting disordered eating were more likely to report condition related limitations. When adjusted for limitations, the association between chronic medical conditions and disordered eating remained.

Violent behavior was positively associated with condition related activity limitations among females; girls at risk of violent behavior were more likely to report any limitation in activity. However this relationship did not remain statistically significant after adjusting for age, race, protective factors and physical or sexual abuse. Controlling for limitations did not change the relationships between chronic health conditions and violent behavior, except for chronic medical conditions and violent behavior, which was no longer statistically significant.

Presence of condition related limitations was positively associated with suicidal behavior. This association was statistically significant only among females and high risk behavior (suicide attempt). After adjustment for limitations (and adjusting for race, age, protective factors and physical or sexual abuse) the associations between learning, emotional and multiple conditions remained significant for both males and females. The relationship between chronic medical condition and suicidal behavior, however, was no longer significant.

Condition related limitation in activity was not associated with risky sexual behaviors and controlling for activity limitations did not change the significance of the relationship between

chronic health conditions and risky sexual behaviors. There was also no association noted between activity limitation and unintentional injury potential, and controlling for activity limitations did not change the significance of the relationship between chronic health conditions and unintentional injury potential.

Discussion

The current study adds to the growing research that adolescents with chronic health conditions are at greater risk for engaging in a number of risk behaviors. Oregon's youth with chronic health conditions as at least as likely, if not more so, to engage in a number of risk behaviors as compared to their peers. These youth were also less likely to report protective factors and more likely to report physical and sexual abuse. Although both the lack of protective factors and history of abuse have been associated with participation in risk behaviors, after controlling for both factors, the relationship between chronic health conditions and risk behaviors remained.

The current data show a high prevalence of chronic health conditions among Oregon's public high school students. Nearly 32 percent reported having a chronic health condition, a prevalence similar to those found in other studies, and toward the upper end of the range reported previously. [58, 59] The differences by gender across the different condition types were also consistent with other studies: a fairly even proportion of males and females reporting chronic medical conditions [7, 8], more females than males reporting emotional conditions [22, 33], and more males than females reporting learning conditions [10, 11, 33].

Overwhelmingly, youth in Oregon with chronic health conditions are *not* engaging *less* in risk behaviors than their peers. For a number of behaviors the prevalence of risk behaviors is

significantly higher among youth with chronic health conditions. Substance abuse, risky sexual behavior, disordered eating behaviors, unintentional injury, suicidal behavior, and violent behavior were all more likely to be reported by youth with chronic health conditions then by youth with no chronic health conditions. More specifically, both males and females with chronic medical conditions were more likely than their peers to report disordered eating, violent behavior and suicidal behavior. Youth with emotional conditions were more likely to report risky behaviors in all of the domains studied. These associations remained in the chronic medical and emotional condition groups after controlling for protective factors and physical and sexual abuse.

Among youth with learning conditions, associations with risk behaviors differed by gender. Initially, females with learning conditions were found to be at increased risk for substance use, disordered eating, violent behavior and suicidal behavior. However, after adjusting for protective factors, the association with suicidal behavior was not statistically significant, and after controlling for physical and sexual abuse, none of the associations were significant. Males with learning conditions were at increased risk for substance use, risky sexual behavior, disordered eating, violent behavior and suicidal behavior. After controlling for protective factors and abuse the association remained with each risk behavior domain except disordered eating.

Use of substances such as tobacco, alcohol, and illicit drugs, is a major threat to the health and well being of adolescents. Of the females and males with no health condition in this study, 41% and 43% respectively reported alcohol use in the prior month. This high level of use was similar among youth reporting chronic medical conditions, use was even higher among youth reporting emotional, learning or multiple conditions. Previous research has demonstrated higher substance abuse particularly among individuals with a variety of emotional conditions as

well as ADHD.[39] The heavy abuse of substances may cause or contribute to cognitive damage and physical symptoms that can make diagnosis and treatment of chronic health conditions difficult.[39]

Although initiation of sexual intercourse in adolescents has been dropping over the last decade [26], sexual intercourse and risky sexual behavior is still prevalent among adolescents.[60] Of the youth reporting no health condition in this study, more than 30% reporting have had sexual intercourse. Similar proportions were reported by youth with medical conditions, indicating that these youth do appear to be as sexually active as their peers. Youth with emotional, learning or multiple conditions were significantly more likely than peers without health conditions to report risky sexual behavior. This is consistent with previous research.[22, 33] Negative consequences of adolescent sexuality, such as pregnancy and sexually transmitted infections, can have important health and social consequences, with youth living with chronic health conditions facing even graver consequences.

While females were still more likely to report disordered eating behaviors than males, the association between having a chronic health condition and disordered eating in the current study was stronger among males than females. This relationship has been shown in previous studies.[31, 37] Females have been the focus of many studies concerning disordered eating behaviors, however the current results supports the need for assessing this behavior not only among females, but also among males.

Violence and unintentional injuries affect all youth.[43] Unintentional injuries are the leading cause of death among Oregon's and the nation's adolescents.[26, 61] In this study, the risk for violent behavior was significantly higher among both males and females with emotional conditions and multiple conditions. Males with chronic medical conditions were also at greater

risk for violent behavior. It was not possible to determine the reasons for carrying a weapon or why fights started. However, youth with chronic health conditions are reported to have high rates of behavioral problems and may have fewer coping skills for avoiding physical altercations.[14]

Suicide is the second leading causes of death among Oregon's adolescents.[61] Youth with chronic health conditions, regardless of their condition type or gender were more likely to report suicidal behaviors. This is not surprising in light of previous reports supporting the association between a chronic health condition and increased emotional distress in adolescents.[11, 32] The magnitude of the increased risk is cause for concern. Youth with emotional conditions (which includes depression disorders) and multiple conditions were 11 to 15 times more likely to attempt suicide than youth with no health conditions.

Limitation in age-appropriate activities has been used in previous studies to measure disability.[8, 58, 62, 63] The prevalence of condition related activity limitation in the current study was 8.8%, this is within the range of other reported estimates of 6.5% and 13.3%.[8, 58, 63] This variability is most likely due to the different criteria used to identify chronic health conditions. A study of limitations due to mental health conditions reported that more than three percent of school-aged children have condition related disability.[61]

The presence of a limitation in activity appears to play a role in the relationship between chronic health conditions and risk behaviors. When condition related limitations in activity were added into the logistic regression models, some of the associations between chronic health conditions and risk behaviors were no longer significant. This suggests that the presence of condition related disability, as measured by limitations in activity, may help to explain some of the association between chronic health conditions and participation in risk behaviors. After

controlling for activity limitations, chronic medical conditions were no longer significantly associated with violent behavior and suicidal behavior; only the association between chronic medical conditions and disordered eating remained. Controlling for condition related limitations in activity also affected the association between learning conditions and substance use, which was no longer significant for males. Males with learning conditions were still more likely to report risky sexual behavior, disordered eating, violent behavior and suicidal behavior. The presence of condition related limitations in activity did not appear to have a significant affect on the relationship between emotional conditions and risk behaviors.

In the current study, the history of physical or sexual abuse was consistently associated with increased engagement in risk behaviors. This association between abuse and participation in a variety of risk behaviors has been reported in previous studies.[42, 43, 45] There also is support in both the current study and in previous studies as to the increased likelihood of youth with chronic health conditions to report physical and sexual abuse than their peers.[22, 26, 30, 31, 44, 46, 47]

The history of physical or sexual abuse may be more strongly associated with certain risk behaviors than are chronic health conditions. For example, after controlling for physical and sexual abuse, the association between learning conditions and disordered eating was no longer statistically significant. However, the association between chronic medical conditions and disordered eating remained statistically significant after controlling for demographic, protective factors and physical and sexual abuse suggesting that chronic medical conditions are an independent risk factor, or that factors associated with chronic medical conditions are contributing to the increased risk, for disordered eating. Due to the potential long-term effects of physical and sexual abuse, and their higher risk of abuse, youth with chronic health conditions

should be screened for a history of abuse. As youth with chronic health conditions have been shown to access more services, regular screening for abuse history could allow for the appropriate referrals whereby youth could receive appropriate treatment.

Youth with chronic health conditions were less likely than peers to report a number of protective factors. This is consistent with previous research that has shown youth with chronic health conditions do not appear to have the same level of protective factors available to them.[32, 34] In the current study controlling for protective factors did not significantly change the relationship between chronic health conditions and risk behaviors. This may in part be due to the YRBS containing few questions that assess for protective factors. Exploring other potential protective factors may prove helpful in determining optimal assets.[50-54] While the purpose of the YRBS is to focus on risk behaviors, attention to potential protective factors is important. Increasing resiliency among youth may be an effective way to decrease susceptibility to and impact of engagement of youth in risk behaviors. In pondering ways to support adolescent health and well being, enhancing protective factors can have long lasting and far reaching positive consequences.[64]

Youth participate in risk behaviors for multiple reasons.[25] The presence of a chronic health condition may play a part in this decision making process. While not a focus the current study, there is previous research which supports the idea of commonalities among youth with chronic health condition in regards to their engagement in risk behaviors.[65] Adolescents with chronic health conditions face the same challenges as their peers without chronic health conditions in regards to identity formation, conforming to social norms within their peer group, and developing independence from their parents.[1] However the presence of a chronic health condition may make the development of independence from concerned parents or minimizing

differences between themselves and their peers more difficult. Youth may therefore choose to participate in risk behaviors as a way to exert their independence or be accepted by their peer group. This may help to explain the similarities found in the current study across the different condition groups.

Recent studies indicate that the number of youth being identified with chronic health conditions in primary care settings has been increasing [66], with emotional and behavioral problems referred to by some as "the new hidden morbidity" [67]. Youth with chronic health conditions are utilizing more health care services [15, 16], and the recognition of the increasing needs of these youth have prompted efforts to focus on developing a system of care that is appropriate for these children.[59] Research needs to continue in order to develop optimal support systems. Each interaction with school, community and health care settings provides an opportunity for appropriate education and interventions. Youth with chronic health conditions face similar challenges as their adolescent peers and should receive similar prevention messages concerning risk behaviors. In considering a youth's risk for adverse health outcomes, there needs to be a careful assessment of risk factors including physical and sexual abuse. Equally important are efforts to increase the resiliency of youth by facilitating the development of protective factors.

Limitations

There are several limitations that need to be considered when interpreting the findings of this secondary data analysis. The data were collected by self-report. While a health care provider did not confirm the presence of a chronic health condition, the proportion of youth

reporting these conditions is consistent with previous studies. Studies have also shown that self-reporting by adolescents concerning health issues and behaviors can be reliable.

The current study does not allow one to distinguish between youth with more than one health condition such as a youth who identifies with one medical condition as compared to a youth who identifies with two medical conditions. There is previous research to support that with an increasing number of conditions an individual reports increasing disability and behavior problems.

Questions concerning chronic health conditions were toward the end of the survey and therefore youth with more severe conditions or learning or attention disabilities may have been less likely to answer the chronic health condition questions. Due to sampling from public high schools, students with chronic health conditions, and in particular, severe conditions may have been more likely to be absent from school than their peers and may have been excluded from this analysis.

The cross-sectional study design allows for the examination of associations between the presence of chronic health conditions and risk behaviors, however it does not allow for statements regarding the causation. The Oregon YRBS, as a large sample, provides more representative results and more precise prevalence estimates than smaller samples. However this was a convenience sample and therefore the results may not be generalizable to other populations.

Conclusion

Engagement of adolescents in risk behaviors is a multi-faceted and dynamic process. In exploring this process it is important to recognize the adolescent's perceived positive outcomes from risk behaviors. These might include gaining social acceptance from peers and developing a

sense of independence, both important and normal aspects of adolescent development. Adolescents with chronic health conditions appear to be at least as likely, and often more likely, to engage in risk behaviors as their peers without chronic health conditions. The presence of a chronic health condition may add a level of complexity, not only in the reasons for engagement in risk behaviors but also in the health consequences.

If our goal as a community is to decrease the involvement in and negative outcomes from engagement in risk behaviors by youth, it is important not only to understand the underlying decision processes and reasons for such engagement but also the interrelated nature of engagement in risk behaviors. Involvement in risk behaviors is often clustered; youth who engage in one risk behavior are more likely to engage in other risk behaviors. So in addressing an adolescent's engagement in risk behaviors, it is important to assess for multiple behaviors and provide comprehensive interventions. For youth with chronic health conditions, the intervention will also need to accommodate any special needs created by the health condition.

Interventions that are focused on characteristics that are susceptible to change and maximize positive outcomes for an individual seem ideal. Protective factors have been shown to increase an individual's resiliency to avoid engagement in risk behaviors. Facilitating and nurturing the development of protective factors in children of all ages is a proactive step toward decreasing their involvement in risk behaviors. What factors are protective varies by risk behavior. A factor that is "protective" for one behavior may not be so for another behavior. Teasing out what differences exist for different risk behaviors and protective factors will be important. Just as the engagement in risk behaviors is multi-faceted and interwoven, so too are the components of resiliency. Effective strategies to reduce risk and to improve health outcomes

among adolescents should consider family, school, community, peer and individual characteristics.

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Appendix A. Questions from the 1999 Oregon YRBS used for secondary data analysis

Chronic Health Conditions

112. Has a doctor, nurse or other professional ever told you that you have one or more of the following? (Check any that apply)
    a. A medical condition which has lasted over a year (for example asthma, arthritis, cancer, diabetes, heart problems, seizures, hearing or vision problems other than glasses or contacts, etc.)
    b. Depression, problems with anxiety or fearfulness, or an eating disorder (anorexia or bulimia)
    c. A learning disorder, attention deficit disorder or ADHD
    d. I've never been told that I have any physical, learning or emotional condition that has lasted longer than a year.

113. Does your physical, learning or emotional condition keep you from doing some things other kids your age do? (Check all that apply)
    a. No limitations or does not apply to me
    b. Yes, it limits my ability to go to school or do regular school work
    c. Yes, it limits my ability to do strenuous activities such as running ,swimming, or other sports
    d. Yes, it limits my ability to make friends
    e. Yes it causes me to have difficulty with personal care such as bathing, dressing, eating or using the toilet

114. Do you think that other people can tell that you have a physical, learning, or emotional condition?
    a. No, never or does not apply
    b. Yes, sometimes
    c. Yes, always

Demographics

1. How old are you?
    a. 11 years old or younger
    b. 12 years old
    c. 13 years old
    d. 14 years old
    e. 15 years old
    f. 16 years old
    g. 17 years old
    h. 18 years old or older

2. What is your sex?
    a. Female
    b. Male

3. How do you describe yourself (select one or more responses)? Race/ethnicity
    a. American Indian/ Alaska Native
    b. Asian
    c. Black or African American
    d. Hispanic or Latino
    e. Native Hawaiian or Other Pacific Islander
    f. White

Unintential Injury Potential

8. How often do you wear a seatbelt when riding in a car driven by someone else?
    a. Never
    b. Rarely
    c. Sometimes
    d. Most of the time
    e. Always

9. During the past 30 days, how many times did you ride in a car or other vehicle driven by someone who had been drinking alcohol?
   a. 0 times
   b. 1 time
   c. 2 or 3 times
   d. 4 or 5 times
   e. 6 or more times

10. During the past 30 days, how many times did you ride in a car or other vehicle when you had been drinking alcohol?
   a. 0 times
   b. 1 time
   c. 2 or 3 times
   d. 4 or 5 times
   e. 6 or more times

Substance Use

Smoking

33. How old were you when you smoked a whole cigarette for the first time?
   a. I have never smoked a whole cigarette
   b. 8 years old or younger
   c. 9 or 10 years old
   d. 11 or 12 years old
   e. 13 or 14 years old
   f. 15 or 16 years old
   g. 17 years old or more

34. During the past 30 days, on how many days did you smoke cigarettes?
   a. 0 days
   b. 1 or 2 days
   c. 3 to 5 days
   d. 6 to 9 days
   e. 10 to 19 days
   f. 20 to 29 days
   g. all 30 days

Alcohol

56. How old were you when you had your first drink of alcohol other than a few sips?
   a. I have never had a drink of alcohol other than a few sips
   b. 8 years old or younger
   c. 9 or 10 years old
   d. 11 or 12 years old
   e. 13 or 14 years old
   f. 15 or 16 years old
   g. 17 years old or more

57. During the past 30 days, on how many days did you have at least one drink of alcohol?
   a. 0 days
   b. 1 or 2 days
   c. 3 to 5 days
   d. 6 to 9 days
   e. 10 to 19 days
   f. 20 to 29 days
   g. all 30 days

Marijuana

61. How old were you when you tried marijuana for the first time?
    a. I have never tried marijuana
    b. 8 years old or younger
    c. 9 or 10 years old
    d. 11 or 12 years old
    e. 13 or 14 years old
    f. 15 or 16 years old
    g. 17 years old or more

62. During the past 30 days, how many times did you use marijuana?
    a. 0 times
    b. 1 or 2 times
    c. 3 to 9 times
    d. 10 to 19 times
    e. 20 to 39 times
    f. 40 or more times

Inhalants

67. During your life, how many times have you sniffed glue, breathed the contents of aerosol spray cans, or inhaled any paints or sprays to get high?
    a. 0 times
    b. 1 or 2 times
    c. 3 to 9 times
    d. 10 to 19 times
    e. 20 to 39 times
    f. 40 or more times

68. During the past 30 days, how many times have you sniffed glue, breathed the contents of aerosol spray cans, or inhaled any paints or sprays to get high?
    a. 0 times
    b. 1 or 2 times
    c. 3 to 9 times
    d. 10 to 19 times
    e. 20 to 39 times
    f. 40 or more times

Other Illicit Drugs

64. During your life, how many times have you used any form of cocaine, including powder, crack, or freebase?
    a. 0 times
    b. 1 or 2 times
    c. 3 to 9 times
    d. 10 to 19 times
    e. 20 to 39 times
    f. 40 or more times

69. During your life, how many times have you used heroin?
    a. 0 times
    b. 1 or 2 times
    c. 3 to 9 times
    d. 10 to 19 times
    e. 20 to 39 times
    f. 40 or more times

70. During your life, how many times have you used methamphetamines (also called speed, crystal, crank, or ice)?
    a. 0 times
    b. 1 or 2 times
    c. 3 to 9 times
    d. 10 to 19 times
    e. 20 to 39 times
    f. 40 or more times

Violent Behavior

14. During the past 30 days, on how many days did you carry a weapon such as a gun, knife or club?
    a. 0 days
    b. 1 day
    c. 2 or 3 days
    d. 4 or 5 days
    e. 6 or more days

21. During the past 12 months, how many times were you in a physical fight?
    a. 0 times
    b. 1 time
    c. 2 or 3 times
    d. 4 or 5 times
    e. 6 or 7 times
    f. 8 or 9 times
    g. 10 or 11 times
    h. 12 or more times

Physical Abuse

24. During the past 12 months, did your boyfriend or girlfriend ever hit, slap, or physically hurt you on purpose?
    a. Yes
    b. No

25. During the past 12 months did any adult family member ever hit slap or physically hurt you on purpose?
    a. Yes
    b. No

Sexual Abuse

26. Have you ever been forced to have sexual intercourse when you did not want to?
    a. Yes
    b. No

27. Other than forced sexual intercourse, have you ever been touched sexually when you did not want to be touched?
    a. Yes
    b. No

Suicidal Behavior

29. During the past 12 months, did you ever seriously consider attempting suicide?
    a. Yes
    b. No

30. During the past 12 months, how many times did you actually attempt suicide?
    a. Yes
    b. No

Sexual Behavior

78. Have you ever had sexual intercourse?
    a. Yes
    b. No

79. How old were you when you had sexual intercourse for the first time?
    a. I have never had sexual intercourse
    b. 11 years old or younger
    c. 12 years old
    d. 13 years old
    e. 14 years old
    f. 15 years old
    g. 16 years old
    h. 17 years old or older

81. During your life, with how many people have you had sexual intercourse?
    a. I have never had sexual intercourse
    b. 1 person
    c. 2 people
    d. 3 people
    e. 4 people
    f. 5 people
    g. 6 or more people

83. Did you drink alcohol or use drugs before you had sexual intercourse the last time?
    a. I have never had sexual intercourse
    b. Yes
    c. No

85. The last time you had sexual intercourse, what one method did you or your partner use to prevent pregnancy?
    a. I have never had sexual intercourse
    b. No method was used to prevent pregnancy
    c. Birth control pills
    d. Condoms
    e. Depo provera (birth control shot)
    f. Withdrawal
    g. Some other method
    h. Not sure

Disordered Eating

95. During the past 30 days, did you go without eating for 24 hours or more to lose weight or to keep from gaining weight?
    a. Yes
    b. No

96. 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?
    a. Yes
    b. No

97. During the past 30 days, did you vomit or take laxatives to lose weight or to keep from gaining weight?
    a. Yes
    b. No

Protective Factors

102. How many times during the past 7 days did you eat a meal with your family?
   a. 0 times
   b. 1 time
   c. 2 times
   d. 3 times
   e. 4 times
   f. 5-6 times
   g. I ate with my family daily
   h. I was away from home and not with my family during the last 7 days

106. During the past 12 months, on how many sports teams did you play?
   a. 0 teams
   b. 1 team
   c. 2 teams
   d. 3 or more teams

108. Thinking back over the last month, in an average week how many hours do you spend in volunteer work, religious activities, youth groups, music, drama, or special school activities?
   a. 0 hours
   b. 1-2 hours
   c. 3-5 hours
   d. 6-10 hours
   e. 11-17 hours
   f. 18-24 hours
   g. 25 or more hours

121. When you are scared, worried, or concerned about yourself or your friends, is there a caring adult you can talk to?
   a. No, there is no adult
   b. Yes, 1 adult
   c. Yes, 2 or 3 adults
   d. Yes, 4 or more adults

Appendix B. Summary of univariate analysis of risk behaviors, and risk and protective factors as related to chronic health conditions.

	Medical only OR (99% CI)	**Emotional only** OR (99% CI)	**Learning only** OR (99% CI)	**Multiple** OR (99% CI)
Substance Use				
Current cigarette smoking				
Female	1.093 (0.927, 1.289)	***2.756 (2.249, 3.377)***	***1.842 (1.252, 2.709)***	***2.769 (2.190, 3.502)***
Male	1.048 (0.877, 1.253)	***3.015 (2.232, 4.0072)***	***1.443 (1.101, 1.890)***	***1.908 (1.360, 2.659)***
Current alcohol use				
Female	1.079 (0.936, 1.244)	***2.170 (1.776, 2.652)***	1.099 (0.758, 1.592)	***1.971 (1.566, 2.481)***
Male	1.049 (0.904, 1.218)	***1.760 (1.308, 2.369)***	1.143 (0.898, 1.456)	*1.440 (1.052, 1.970)*
Current marijuana use				
Female	1.100 (0.919, 1.316)	***2.342 (1.890, 2.902)***	*1.579 (1.038, 2.401)*	***2.316 (1.810, 2.965)***
Male	1.137 (0.957, 1.351)	***2.452 (1.827, 3.292)***	***1.405 (1.076, 1.834)***	***1.598 (1.140, 2.241)***
Ever inhalant use				
Female	*1.234 (1.005, 1.517)*	***2.780 (2.202, 3.511)***	1.559 (0.958, 2.537)	***3.560 (2.760, 4.593)***
Male	***1.371 (1.097, 1.713)***	***2.894 (2.054, 4.078)***	***1.725 (1.236, 2.407)***	***3.245 (2.261, 4.658)***
Ever illicit drug use				
Female	*1.333 (1.318, 1.347)*	***3.866 (3.823, 3.909)***	*1.799 (1.755, 1.844)*	***4.612 (4.556, 4.668)***
Male	1.221 (0.944, 1.580)	***4.100 (2.916, 53766)***	***1.615 (1.108, 2.354)***	***2.602 (1.718, 3.940)***

Italics = significance <0.01, ***bold italics = significance <0.001***

	Medical only OR (99% CI)	**Emotional only** OR (99% CI)	**Learning only** OR (99% CI)	**Multiple** OR (99% CI)
Sexual Behavior				
Ever had sex				
Female	1.042 (0.931, 1.167)	***2.837*** ***(2.437, 3.304)***	1.351 (1.015, 1.797)	***2.935*** ***(2.460, 3.500)***
Male	1.112 (0.989, 1.252)	***3.007*** ***(2.404, 3.762)***	***1.530*** ***(1.271, 1.843)***	***1.931*** ***(1.523, 2.448)***
Ineffective birth control				
Female	1.048 (0.843, 1.303)	1.170 (0.921, 1.486)	0.964 (0.562, 1.652)	1.012 (0.762, 1.344)
Male	1.154 (0.908, 1.468)	1.434 (1.008, 2.039)	1.178 (0.826, 1.680)	1.172 (0.757, 1.814)
< 12 when first had sex				
Female	***1.963*** ***(1.393, 2.766)***	***2.583*** ***(1.823, 3.661)***	1.277 (0.506, 3.226)	***3.181*** ***(2.198, 4.604)***
Male	*1.435* *(1.097, 1.879)*	***2.417*** ***(1.700, 3.436)***	*1.742* *(1.199, 2.530)*	***2.286*** ***(1.505, 3.473)***
Multiple life sexual partners				
Female	1.231 (1.022, 1.482)	***1.625*** ***(1.316, 2.006)***	0.962 (0.614, 1.508)	***1.776*** ***(1.390, 2.268)***
Male	1.084 (0.892, 1.316)	*1.645* *(1.206, 2.243)*	1.412 (1.049, 1.901)	1.340 (0.939, 1.914)
Substance use with last sex				
Female	1.2233 (0.993, 1.530)	***1.907*** ***(1.526, 2.383)***	0.994 (0.577, 1.713)	1.251 (0.952, 1.646)
Male	1.107 (0.900, 1.361)	1.329 (0.982, 1.796)	0.845 (0.612, 1.166)	1.035 (0.712. 1.505)
Disordered Eating				
Fast for 24+ hrs				
Female	***1.536*** ***(1.329, 1.776)***	-	***1.882*** ***(1.336, 2.652)***	-
Male	***2.070*** ***(1.588, 2.697)***	-	1.480 (0.924, 2.372)	-
Diet pills, etc.				
Female	***1.413*** ***(1.172, 1.703)***	-	*1.917* *(1.258, 2.922)*	-
Male	***2.521*** ***(1.763, 3.604)***	-	*2.176* *(1.226, 3.862)*	-
Vomit or laxatives				
Female	1.303 (1.031, 1.647)	-	1.513 (0.869, 2.634)	-
Male	***5.135*** ***(2.981, 8.844)***	-	***4.909*** ***(2.270, 10.618)***	-

Italics = significance <0.01, ***bold italics = significance <0.001***

	Medical only OR (99% CI)	**Emotional only** OR (99% CI)	**Learning only** OR (99% CI)	**Multiple** OR (99% CI)
Unintentional Injury				
Infrequent seatbelt use				
Female	1.230 (0.952, 1.589)	***2.091*** ***(1.550, 2.821)***	*1.894* *(1.089, 3.294)*	***2.405*** ***(1.732, 3.339)***
Male	1.046 (0.848, 1.291)	***2.168*** ***(1.558, 3.018)***	1.075 (0.766, 1.509)	*1.504* *(1.011, 2.236)*
Drink and drive				
Female	1.181 (0.909, 1.535)	***1.880*** ***(1.376, 2.568)***	0.760 (0.339, 1.704)	***1.779*** ***(1.235, 2.562)***
Male	1.039 (0.828, 1.303)	***2.181*** ***(1.531, 3.106)***	1.054 (0.731, 1.519)	1.155 (0.730, 1.828)
Ride with someone drinking				
Female	1.024 (0.870, 1.205)	***1.995*** ***(1.627, 2.447)***	0.979 (0.639, 1.498)	***1.965*** ***(1.551, 2.489)***
Male	***1.238*** ***(1.050, 1.459)***	***2.271*** ***(1.699, 3.036)***	***1.380*** ***(1.063, 1.791)***	1.312 (0.931, 1.849)
Violent Behavior				
Carry a weapon				
Female	***1.656*** ***(1.210, 2.267)***	***2.410*** ***(1.653, 3.516)***	1.464 (0.648, 3.331)	***3.741*** ***(2.577, 5.432)***
Male	*1.205* *(1.018, 1.426)*	***2.479*** ***(1.845, 3.332)***	***1.453*** ***(1.116, 1.891)***	***2.276*** ***(1.651, 3.137)***
In a physical fight				
Female	***1.582*** ***(1.309, 1.910)***	***2.949*** ***(2.350, 3.702)***	*1.719* *(1.082, 2.730)*	***4.177*** ***(3.266, 5.343)***
Male	***1.309*** ***(1.123, 1.525)***	***2.917*** ***(2.189, 3.888)***	***1.899*** ***(1.494, 2.414)***	***2.134*** ***(1.563, 2.913)***
Suicidal Behavior				
Considered suicide				
Female	***1.609*** ***(1.350, 1.919)***	***6.458*** ***(5.258, 7.931)***	1.432 (0.907, 2.261)	***6.858*** ***(5.423, 8.672)***
Male	***1.643*** ***(1.305, 2.068)***	***6.776*** ***(4.978, 9.225)***	***2.288*** ***(1.646, 3.180)***	***6.384*** ***(4.558, 8.941)***
Suicide attempt				
Female	***1.641*** ***(1.238, 2.174)***	***8.406*** ***(6.502, 10.867)***	***2.633*** ***(1.457, 4.757)***	***8.952*** ***(6.742, 11.885)***
Male	***1.927*** ***(1.236, 3.005)***	***12.159*** ***(7.728, 19.130)***	***2.837*** ***(1.569, 5.131)***	***11.053*** ***(6.866, 17.795)***

Italics = significance <0.01, ***bold italics = significance <0.001***

	Medical only OR (99% CI)	**Emotional only** OR (99% CI)	**Learning only** OR (99% CI)	**Multiple** OR (99% CI)
Abuse				
Physical abuse				
Female	***1.467 (1.233, 1.746)***	***2.922 (2.361, 3.616)***	***1.773 (1.164, 2.700)***	***4.138 (3.270, 5.237)***
Male	***1.343 (1.103, 1.635)***	***3.057 (2.243, 4.167)***	***1.671 (1.240, 2.252)***	***3.016 (2.151, 4.229)***
Sexual abuse				
Female	***1.377 (1.183, 1.602)***	***3.417 (2.800, 4.169)***	***1.763 (1.213, 2.562)***	***4.369 (3.466, 5.507)***
Male	***1.514 (1.155, 1.984)***	***3.785 (2.589, 5.535)***	***2.053 (1.394, 3.023)***	***2.759 (1.758, 4.331)***
Protective Factors				
Caring adult				
Female	0.924 (0.784, 1.089)	***0.618 (0.504, 0.758)***	0.818 (0.546, 1.228)	***0.553 (0.440, 0.694)***
Male	***0.727 (0.633, 0.835)***	***0.359 (0.285, 0.453)***	*0.706 (0.565, 0.882)*	***0.503 (0.385, 0.657)***
Community/school activities				
Female	1.022 (0.907, 1.151)	0.723 (0.617, 0.847)	*0.642 (0.482, 0.854)*	1.053 (0.865, 1.282)
Male	1.113 (0.994, 1.245)	1.242 (0.994, 1.551)	0.988 (0.823, 1.185)	1.158 (0.910, 1.474)
Sports team				
Female	0.950 (0.854, 1.057)	***0.590 (0.509, 0.685)***	0.774 (0.589, 1.018)	***0.682 (0.575, 0.810)***
Male	***0.762 (0.679, 0.854)***	***0.608 (0.489, 0.756)***	***0.649 (0.541, 0.780)***	***0.541 (0.427, 0.684)***
Family meals				
Female	0.868 (0.775, 0.973)	***0.554 (0.476, 0.645)***	0.778 (0.582, 1.040)	***0.517 (0.433, 0.616)***
Male	***0.808 (0.711, 0.919)***	***0.476 (0.379, 0.597)***	0.822 (0.666, 1.014)	***0.598 (0.463, 0.772)***

Italics = significance <0.01, ***bold italics = significance <0.001***

Appendix C. Summary of multiple logistic regression for each risk behavior domain by gender

Violence

	Female		Male	
	OR 99% CI	significance	OR 99% CI	significance
Condition				
Medical	1.385 (1.126, 1.703)	<0.001	1.155 (0.979, 1.363)	0.025
Emotional	1.767 (1.364, 2.290)	<0.001	2.186 (1.543, 3.096)	<0.001
Learning	1.287 (0.783, 2.113)	0.191	1.508 91.153, 1.971)	<0.001
Multiple	2.226 (1.646, 3.009)	<0.001	1.612 (1.125, 2.308)	0.001
Protective factors				
Family meals	0.730 (0.623, 0.855)	<0.001	0.973 (0.843, 1.122)	0.618
Sports team	0.929 (0.795, 1.085)	0.223	1.109 (0.977, 1.258)	0.035
Caring adult	0.816 (0.662, 1.005)	0.012	0.783 (0.671, 0.914)	<0.001
Community/school	0.777 (0.660, 0.915)	<0.001	0.808 (0.716, 0.911)	<0.001
Risk factors				
Physical abuse	2.976 (2.524, 3.508)	<0.001	2.475 (2.087, 2.935)	<0.001
Sexual abuse	1.937 (1.654, 2.267)	<0.001	2.157 (1.687, 2.758)	<0.001
Limitation	1.153 (0.900, 1.478)	0.139	1.095 (0.841, 1.425)	0.376

Unintentional Injury Potential

	Female		Male	
	OR 99% CI	significance	OR 99% CI	significance
Condition				
Medical	1.052 (0.884, 1.251)	0.455	1.112 (0.937, 1.319)	0.111
Emotional	1.654 (1.317, 2.077)	<0.001	1.767 (1.268, 2.462)	<0.001
Learning	1.025 (0.672, 1.563)	0.881	1.052 (0.797, 1.390)	0.636
Multiple	1.661 (1.259, 2.191)	<0.001	1.106 (0.774, 1.580)	0.467
Protective factors				
Family meals	0.687 (0.603, 0.782)	<0.001	0.781 (0.677, 0.901)	<0.001
Sports team	1.082 (0.954, 1.228)	0.108	1.063 (0.934, 1.211)	0.225
Caring adult	0.757 (0.633, 0.904)	<0.001	0.680 (0.583, 0.792)	<0.001
Community/school	0.550 (0.482, 0.628)	<0.001	0.550 (0.486, 0.622)	<0.001
Risk factors				
Physical abuse	1.753 (1.509, 2.037)	<0.001	1.691 (1.434, 1.995)	<0.001
Sexual abuse	1.669 (1.462, 1.905)	<0.001	1.626 (1.290, 2.050)	<0.001
Limitation	0.861 (0.687, 1.080)	0.089	1.107 (0.853, 1.437)	0.314

Suicidal Behavior

	Female						Male					
	Medium			High			Medium			High		
	OR	99%CI	signif	OR	99%CI	signif	OR	99%CI	signif	OR	99%CI	signif
Condition												
Medical	1.428 (1.115, 1.829)		<0.001	1.275 (0.916, 1.775)		0.058	1.470 (1.087, 1.988)		0.001	1.557 (0.952, 2.545)		0.202
Emotional	3.345 (2.481, 4.510)		<0.001	6.689 (4.857, 9.214)		<0.001	3.692 (2.315, 5.887)		<0.001	7.716 (4.329, 13.751)		<0.001
Learning	0.826 90.407, 1.676)		0.486	1.297 (0.622, 2.703)		0.362	1.418 (0.882, 2.280)		0.058	2.330 (1.209, 4.491)		0.001
Multiple	3.016 (2.106, 4.317)		<0.001	5.742 (3.928, 8.394)		<0.001	3.025 (1.845, 4.959)		<0.001	7.688 (4.296, 13.760)		<0.001
Protective factors												
Family meals	0.833 (0.689, 1.008)		0.014	0.708 (0.564, 0.890)		<0.001	0.774 (0.601, 0.997)		0.009	0.519 (0.362, 0.744)		<0.001
Sports team	0.741 (0.616, 0.890)		<0.001	0.811 (0.646, 1.018)		0.017	0.851 (0.672, 1.076)		0.076	0.944 (0.661, 1.348)		0.675
Caring adult	0.446 (0.353, 0.562)		<0.001	0.501 (0.379, 0.663)		<0.001	0.528 (0.409, 0.681)		<0.001	0.418 (0.291, 0.602)		<0.001
Community/school	1.090 (0.889, 1.336)		0.276	0.700 (0.553, 0.885)		<0.001	1.012 (0.803, 1.276)		0.894	1.166 (0.816, 1.666)		0.267
Risk factors												
Physical abuse	2.341 (1.913, 2.864)		<0.001	2.881 (2.225, 3.550)		<0.001	2.230 (1.722, 2.888)		<0.001	3.133 (2.186, 4.490)		<0.001
Sexual abuse	1.600 (1.323, 1.934)		<0.001	2.939 (2.337, 3.695)		<0.001	2.002 (1.426, 2.809)		<0.001	2.629 (1.692, 4.083)		<0.001
Limitation	1.196 (0.888, 1.609)		0.121	1.632 (1.188, 2.242)		<0.001	1.328 (0.900, 1.961)		0.060	1.485 (0.907, 2.432)		0.039

Substance Use

	Female					
	Low		Medium		High	
	OR 99% CI	significance	OR 99% CI	significance	OR 99% CI	significance
Condition						
Medical	1.224 (0.854, 1.572)	0.037	1.068 (0.859, 1.329)	0.436	1.176 (0.858, 1.613)	0.185
Emotional	1.808 (1.150, 2.844)	0.001	2.526 (1.725, 3.700)	<0.001	4.671 (3.017, 7.232)	<0.001
Learning	1.181 (0.592, 2.354)	0.536	1.334 (0.756, 2.354)	0.191	1.796 (0.860, 3.749)	0.040
Multiple	2.218 (1.251, 3.931)	<0.001	2.805 (1.714, 4.590)	<0.001	6.111 (3.537, 10.559)	<0.001
Protective factors						
Family meals	0.645 (0.522, 0.797)	<0.001	0.497 (0.416, 0.595)	<0.001	0.451 (0.355, 0.571)	<0.001
Sports team	1.031 (0.857, 1.239)	0.673	1.089 (0.931, 1.275)	0.161	0.749 (0.599, 0.935)	0.001
Caring adult	1.150 (0.837, 1.579)	0.258	0.776 (0.603, 1.000)	0.010	0.645 (0.469, 0.885)	<0.001
Community/school	0.671 (0.535, 0.843)	<0.001	0.363 (0.301, 0.435)	<0.001	0.221 (0.173, 0.282)	<0.001
Risk factors						
Physical abuse	1.389 (1.040, 1.857)	0.003	2.517 (1.987, 3.188)	<0.001	3.931 (2.960, 5.219)	<0.001
Sexual abuse	1.531 (1.212, 1.935)	<0.001	2.846 (2.346, 3.454)	<0.001	4.782 93.737, 6.120)	<0.001
Limitation	0.681 (0.467, 0.993)	0.009	0.769 (0.561, 1.055)	0.032	0.876 (0.595, 1.290)	0.378

	Male					
	Low		Medium		High	
	OR 99% CI	significance	OR 99% CI	significance	OR 99% CI	significance
Condition						
Medical	1.058 (0.818, 1.368)	0.575	1.092 (0.879, 1.355)	0.296	1.240 (0.909, 1.693)	0.074
Emotional	1.262 (0.655, 2.432)	0.361	1.932 (1.132, 3.296)	0.001	4.011 (2.201, 7.309)	<0.001
Learning	1.175 (0.770, 1.793)	0.326	1.157 (0.807, 1.659)	0.296	1.493 (0.920, 2.422)	0.033
Multiple	0.771 (0.411, 1.447)	0.288	1.188 (0.735, 1.919)	0.355	1.970 (1.102, 3.522)	0.003
Protective factors						
Family meals	0.759 (0.600, 0.960)	0.002	0.696 (0.572, 0.847)	<0.001	0.496 (0.383, 0.641)	<0.001
Sports team	1.320 (1.086, 1.604)	<0.001	1.436 (1.220, 1.690)	<0.001	0.967 (0.768, 1.217)	0.709
Caring adult	0.771 (0.597, 0.996)	0.009	0.723 (0.583, 0.897)	<0.001	0.522 (0.396, 0.688)	<0.001
Community/school	0.629 (0.519, 0.763)	<0.001	0.415 (0.354, 0.487)	<0.001	0.340 (0.271, 0.429)	<0.001
Risk factors						
Physical abuse	1.458 (1.074, 1.981)	0.002	2.268 (1.765, 2.915)	<0.001	3.799 (2.809, 5.138)	<0.001
Sexual abuse	1.270 (0.773, 2.087)	0.214	2.497 (1.688, 3.695)	<0.001	4.295 (2.766, 6.671)	<0.001
Limitation	1.357 (0.882, 2.087)	0.068	1.180 (0.817, 1.705)	0.246	1.305 (0.828, 2.058)	0.132

Sexual Behavior

	Female						Male					
	Medium			High			Medium			High		
	OR	99%CI	signif	OR	99%CI	signif	OR	99%CI	signif	OR	99%CI	signif
Condition												
Medical	0.799 (0.582, 1.042)		0.027	0.950 (0.771, 1.170)		0.528	1.022 (0.753, 1.387)		0.855	1.144 (0.937, 1.397)		0.083
Emotional	1.576 (1.095, 2.267)		0.001	2.001 (1.537, 2.606)		<0.001	1.721 (0.970, 3.051)		0.015	2.201 (1.514, 3.200)		<0.001
Learning	1.112 (0.593, 2.086)		0.662	0.898 (0.543, 1.484)		0.580	1.031 (0.613, 1.735)		0.880	1.640 (1.207, 2.229)		<0.001
Multiple	1.443 (0.918, 2.268)		0.037	1.883 (1.366, 2.596)		<0.001	1.355 (0.738, 2.488)		0.197	1.677 (1.134, 2.480)		0.001
Protective factors												
Family meals	0.782 (0.636, 0.960)		0.002	0.627 (0.539, 0.729)		<0.001	0.728 (0.572, 0.927)		0.001	0.737 (0.626, 0.867)		<0.001
Sports team	0.969 (0.796, 1.181)		0.682	0.770 (0.665, 0.893)		<0.001	1.441 (1.142, 1.820)		<0.001	1.128 (0.971, 1.312)		0.039
Caring adult	1.189 (0.873, 1.620)		0.149	1.035 (0.837, 1.281)		0.673	1.033 (0.776, 1.374)		0.771	0.729 (0.611, 0.869)		<0.001
Community/school	0.544 (0.439, 0.673)		<0.001	0.379 (0.324, 0.444)		<0.001	0.616 (0.497, 0.764)		<0.001	0.524 (0.454, 0.605)		<0.001
Risk factors												
Physical abuse	1.383 1.076, 1.778)		0.001	2.040 (1.711, 2.432)		<0.001	1.881 (1.421, 2.490)		<0.001	2.081 (1.728, 2.507)		<0.001
Sexual abuse	1.810 (1.464, 2.238)		<0.001	3.477 (2.987, 4.048)		<0.001	1.457 (0.948, 2.240)		0.024	2.905 (2.249, 3.752)		<0.001
Limitation	1.081 (0.747, 1.564)		0.588	1.105 (0.851, 1.435)		0.325	1.030 (0.640, 1.659)		0.872	1.092 (0.813, 1.467)		0.442

Disordered Eating

	Female		Male	
	OR 99% CI	significance	OR 99% CI	significance
Condition				
Medical	1.241 (1.024, 1.505)	0.004	1.586 (1.130, 2.227)	<0.001
Emotional	-	-	-	-
Learning	1.370 (0.875, 2.145)	0.071	1.295 (0.735, 2.280)	0.239
Multiple	-	-	-	-
Protective factors				
Family meals	0.548 (0.475, 0.633)	<0.001	0.488 (0.371, 0.644)	<0.001
Sports team	1.140 (0.988, 1.315)	0.018	1.203 (0.909, 1.591)	0.089
Caring adult	0.804 (0.662, 0.977)	0.004	0.649 (0.484, 0.871)	<0.001
Community/school	0.846 (0.727, 0.984)	0.004	1.081 (0.827, 1.414)	0.454
Risk factors				
Physical abuse	1.648 (1.402, 1.937)	<0.001	1.471 (1.080, 2.004)	0.001
Sexual abuse	1.879 (1.626, 2.172)	<0.001	1.938 (1.328, 2.828)	<0.001
Limitation	1.126 (0.892, 1.423)	0.189	1.766 (1.173, 2.660)	<0.001