2013

INVESTMENT IN SCHOOL HEALTH CAPACITY

Payoffs in HEALTH, ACHIEVEMENT and STRONGER COMMUNITIES

Oregon Health Authority

PUBLIC HEALTH DIVISION
Center for Prevention and Health Promotion
Adolescent and School Health Program

HEALTHY KIDS LEARN BETTER

A Coordinated School Health Approach

INVESTMENT IN SCHOOL HEALTH CAPACITY:

Payoffs in HEALTH, ACHIEVEMENT and STRONGER COMMUNITIES

OREGON HEALTH AUTHORITY, PUBLIC HEALTH DIVISION
Center for Prevention and Health Promotion
Adolescent, Genetics, and Reproductive Health Section
Adolescent and School Health Program

CONTRIBUTING AUTHORS

Isabelle Barbour, *School Health Coordinator,* Adolescent and School Health Program

Nigel Chaumeton, *School Health Research Analyst,* Adolescent and School Health Program

Julia Dilley, *Senior Epidemiologist,* Program Design and Evaluation Services

Robert Nystrom, *Manager,* Adolescent, Genetics, and Reproductive Health Section

Sarah Ramowski, *School Health Economist,* Adolescent and School Health Program

Susan Richardson, *Research Analyst,* Program Design and Evaluation Services

Elizabeth Thorne, *Adolescent Health Policy and Assessment Specialist,* Adolescent and School Health Program

This project was a large undertaking that required the skills and wisdom of many people. The authors would like to specifically acknowledge the following partners for their contributions:

Rachel Gilmer, *Policy and Communications Coordinator,* Oregon Health Authority, Office of Equity and Inclusion

Brett Hamilton, *Executive Director,* Tobacco-Free Coalition of Oregon

Jean Hutchinson, *Policy Analyst,* Oregon Health Authority, Division of Medical Assistance Programs

Jessica Lawrence, *Director,* Cairn Guidance, Inc.

Michael Mahoney, *Safe and Healthy Schools Coordinator,* Oregon Department of Education

John McConnell, Ph.D., *Associate Professor,* Center for Health Systems Effectiveness, Oregon Health & Science University

Brian Reeder, *Assistant Superintendent,* Analysis and Reporting, Oregon Department of Education

Linda Williams, *Policy Analyst,* Oregon Health Authority, Division of Medical Assistance Programs

INVESTING IN SCHOOL HEALTH CAPACITY

Important update regarding the association between Core Capacity and high school graduation

- In the report, Investing in School Health Capacity, we examined the association between the existence of Core Capacity as measured by the 2010 School Health Profiles Survey and 2010 high school graduation rates. We found that the graduation rate for students in schools with Core Capacity was higher than for students in schools without Core Capacity.
- Since the publication of the report, we have again examined the association between the existence of Core Capacity as measured by the 2012 School Health Profiles Survey and 2012 high school graduation rates. In this analysis we did not find a positive association between Core Capacity and graduation. We found that the graduation rate for students in schools with Core Capacity was lower than for students in schools without Core Capacity.
- We believe that supporting quality school health efforts improves academic achievement. There are a number of other pieces of research that provide evidence for this link. We are uncertain of what may be the cause of the different findings between 2010 data and 2012 data. It is possible that the number of schools analyzed is too small to reliably reflect the association between Core Capacity and high school graduation rates. It is also possible that Core Capacity Benchmark may not be the best measure to capture the impact of school health efforts on academic achievement. We will be continuing to monitor trends in the association between Core Capacity and high school graduation rate in future cycles of the School Health Profiles Survey.

TABLE OF CONTENTS

Executive Summary . . . . . a

Healthy Schools, Healthy Students, Healthy Communities 1

What are "Healthy Schools"? 3

SECTION I. Logical Linkages between School, Student and Community Health

Student Well-Being and Health 9

Health Interventions in School Settings 12

Making the Link: Healthy Kids Learn Better 14

When School Health Matters More: Linking Health Equity and the Achievement Gap 17

Making the Link: Successful Students Create Stronger Communities . . . 23

SECTION II. Associating Benefits with School Health Core Capacity

Do Oregon Schools Have Core Capacity for School Health? 25

Core Capacity and Health-Promoting Environments in Schools 27

Does School Health Core Capacity Link to Student Health? 29

Does School Health Core Capacity Link to Achievement? 31

Links to Good Grades 31

Links to Discipline and Attendance 32

Links to High School Graduation 33

SECTION III. Estimating the Economic Value of School Health Core Capacity

Does School Health Core Capacity Link to Stronger Communities? . . . 35

Economic Benefit of Increasing High School Graduation: Background Literature 36

Estimating Costs to Implement School Health Core Capacity 37

Estimating the Economic Return from Investing in Core Capacity . . . 39

Return on Investment Analysis: Oregon and National 40

Economic Capacity 41

Making the Investment in School Health Capacity 42

Importance of Past School Health Capacity-Building Efforts 44

TABLE OF CONTENTS continued

Limitations and Suggestions for Future Study 46

Conclusion: Investment in School Health Provides Long-term Returns . . 48

Appendix A: Data Sources 49

Appendix B: Specific Analytic Methods Summary 52

Appendix C: Tables for Report Figures. 68

References 83

INVESTMENT IN SCHOOL HEALTH CAPACITY

Payoffs in HEALTH, ACHIEVEMENT and STRONGER COMMUNITIES

EXECUTIVE SUMMARY

Oregon Health Authority
PUBLIC HEALTH DIVISION
Center for Prevention and Health Promotion
Adolescent and School Health Program

HEALTHY KIDS LEARN BETTER
A Coordinated School Health Approach

EXECUTIVE SUMMARY

Raising the high school graduation rate is critical to improving the health and prosperity of Oregonians. Higher levels of education are associated with longer life, and an increased likelihood of obtaining and understanding basic health information and services needed to make appropriate health decisions.[i] Lower levels of education predict higher levels of health risks, such as obesity, substance abuse, and violence.[ii] Additionally, better educated Oregonians are more likely to find well-paid employment, less likely to commit crimes, and less likely to rely upon assistance programs such as Medicaid.[iii]

Graduating from high school requires successful progression in several areas of a young person's life. Teachers, school administrators and families understand that a student's emotional, social and physical health impact educational factors such as attendance, test scores, and the ability to pay attention in class. Health-related barriers to learning — such as hunger, depression, and substance abuse — make it difficult for students to be academically or behaviorally successful in school. Because the health and educational status of populations are deeply entwined, it is desirable to identify interventions that support both educational and health goals.

Coordinated School Health Approach

A consensus exists on how to address the connections between health and educational outcomes: A multi-component, coordinated approach is most effective at improving students' health and academic success.[iv] As described by the Centers for Disease Control and Prevention's Coordinated School Health Model, a comprehensive approach to school health includes the elements in figure 1.

FIGURE 1

// a //

However, the existence of each of these elements in isolation is not enough. Coordination is necessary to ensure that school health resources are used in a strategic and sustainable manner.[v] Basic infrastructure and capacity are foundational in supporting effective school health programs and policies. This capacity is created by critical school health components that are recognized as essential for sustainable, evidence-based school health approaches.[vi]

Core Capacity Benchmark

In this report we created a benchmark for the capacity and infrastructure needed to support a multi-component, coordinated school health effort. We labeled this benchmark "Core Capacity". We assessed the prevalence of Core Capacity in Oregon public secondary schools and examined the associations between the presence of Core Capacity and student health and academic outcomes including high school graduation. We then estimated the return on investment (ROI) of implementing Core Capacity in every public secondary school in the state.

To create a benchmark for Core Capacity, we utilized measures from the Centers for Disease Control and Prevention's School Health Profiles Survey. These measures reflect findings from national and state school health research.[vii] For the purposes of this report we have named the concurrent existence of the following components Core Capacity for school health: (1) having a school health coordinator; (2) conducting a health focused self-assessment[1]; (3) having a health-related School Improvement Plan goal and objective; and (4) having a school health advisory group that includes an administrator and a community member. Together these components represent the staffing, data, leadership, accountability, and broad support that is needed to effectively support health and achievement in school settings.[viii]

Core Capacity Benchmark

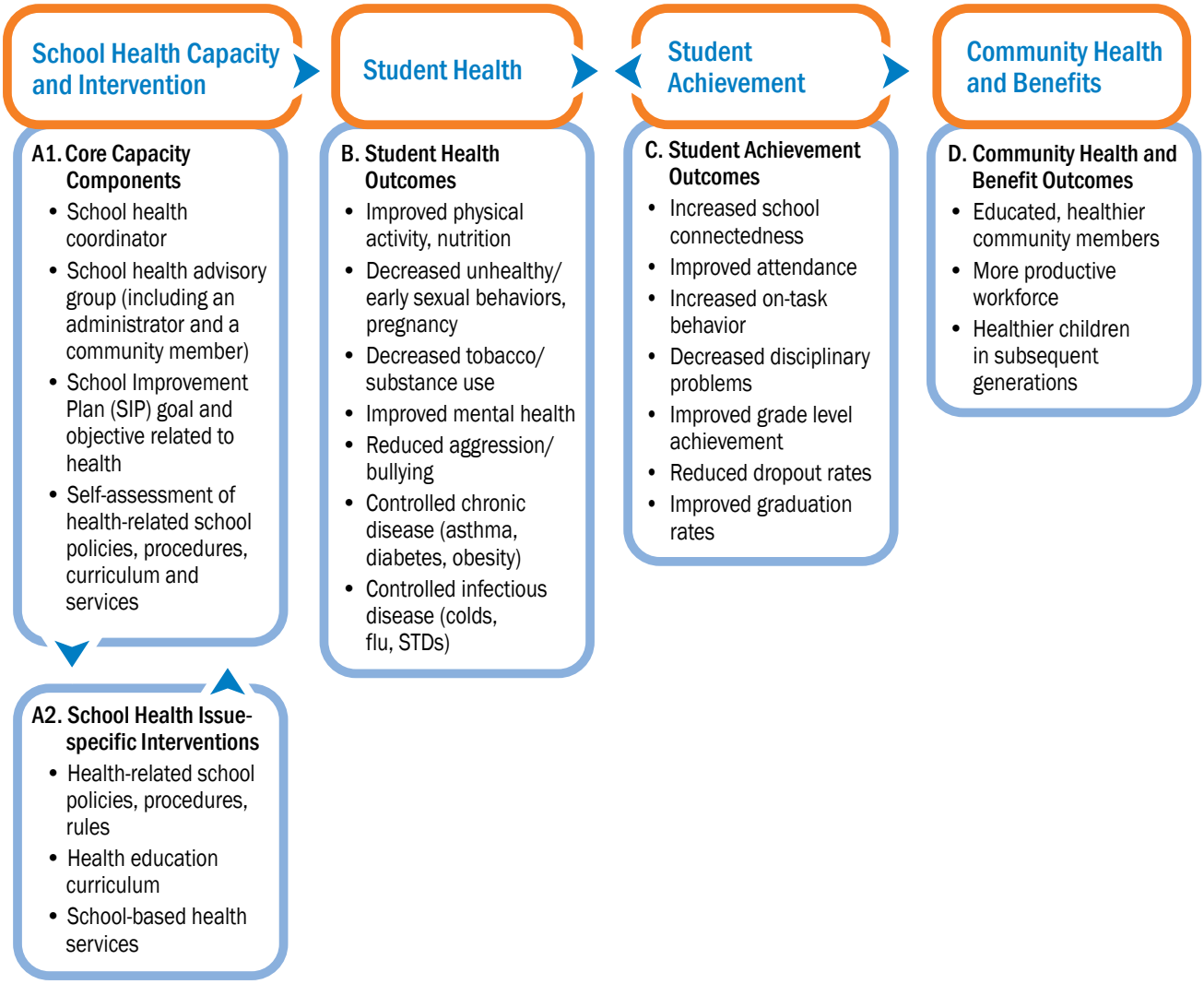
- *School Health Coordinator*
- *Health focused self-assessment*
- *Health goal and objective in School Improvement Plan*
- *School health advisory group*

Core Capacity and Health

Associations among data that were analyzed, coupled with published research, support the concept of progressive links between Core Capacity, student health, achievement and community-level benefits. Figure 2 illustrates this logical path.

[1] Common school health assessments include tools such as the CDC's School Health Index, the Alliance for a Healthier Generation's Healthy Schools Program Inventory, and ASCD's Healthy School Report Card. These tools assess health-related school policies, procedures, curriculum, and services.

FIGURE 2: SCHOOL HEALTH LOGIC MODEL



Core Capacity in Oregon

We comprehensively explored associations between school-level Core Capacity and outcomes from a variety of data sources including:

- District-level disciplinary and attendance data;
- School-level health-related policies and procedures;
- School-level graduation rates; and
- Student-level health factors and achievement.

Only about one in nine (11.1%) Oregon secondary schools had achieved Core Capacity in 2010. Among schools with Core Capacity, we saw greater implementation of evidence-based policies and practices to support healthy school environments (e.g., implementing a bullying prevention program). We explored differences in Core Capacity status by school size, socio-economic status of the student population, and urban/rural community location of the school. We did not find that any of these factors were associated with having Core Capacity.

Core Capacity and Health Indicators

We linked student-level information from the Oregon Healthy Teens Survey and school-level information from the Oregon School Health Profiles Survey to examine associations between school-level Core Capacity and student health experiences. Across health indicators, there were generally consistent associations between having Core Capacity and more students with healthy behaviors. Nine of 11 student-level health measures among eighth-graders, and 10 of 11 student-level health measures among 11th-graders, were higher among students in schools with Core Capacity as compared to students in schools without Core Capacity.[2]

Core Capacity and Education Indicators

Identifying potential connections between school health capacity and educational indicators was a critical goal for this analysis. While findings varied in their statistical significance, the following relationships were observed:

- For both middle schools and high schools, the percentage of students getting good grades was higher in schools that reported having all four components of Core Capacity than in schools without Core Capacity; in high schools, the difference was statistically significant.
- Over the period of a school year, high schools[3] with Core Capacity were in districts that had an average of three fewer attendance policy violations per 100 students per year than schools without Core Capacity.[4]
- For disciplinary actions, high schools with Core Capacity were in districts that had an average of four fewer actions per 100 students per year than high schools[5] without that capacity.[6]

A major finding in this analysis was the relationship between Core Capacity and high school graduation.[7] The graduation rates for students in schools with Core Capacity were higher for all groups of students than for students in schools without Core Capacity. However, the magnitude of the difference varied by sub-group: all students (7% higher), males and females (6%–8% higher), minority youth (4% higher), and economically disadvantaged students (2% higher). All differences were statistically significant except for economically disadvantaged students.

Return on Investment

Building on the differences in graduation rates, a return on investment (ROI) analysis was conducted as part of this study to examine the potential economic impact of

[2] Significant associations present for 8th grade are “eating breakfast” and “drinking 3 or fewer sodas”; significant associations for 11th grade are “eating 5+ fruits and vegetables,” “eating breakfast,” “drinking 3 or fewer sodas” and “not feeling harassed.”
[3] This was not evaluated at the middle school level.
[4] An attendance policy violation means that a student had eight unexcused absences over a four-week period.
[5] This was not evaluated at the middle school level.
[6] Disciplinary actions include: expulsion, in-school suspension, out of school suspension, truancy, and removal to an alternate educational setting.
[7] The sample for this piece of the analysis consisted of 104 high schools. Fourteen of these schools had Core Capacity.

implementing Core Capacity in all Oregon public secondary schools. Benefits estimated include effects on personal income, tax revenue, Medicaid costs, and crime-related costs.

The ROI analysis was based on the increased high school graduation rate found in schools that had Core Capacity as compared to schools that did not have Core Capacity. There are a wide array of factors that impact graduation rates, and we do not attribute the difference solely to the presence of Core Capacity. While we observed a 7% higher on-time graduation rate among high schools with Core Capacity, we chose a more conservative 1% difference to estimate possible returns on investment. This approach avoids overestimation but illustrates the potential benefits of increasing Core Capacity in schools. We defined the costs of supporting Core Capacity in a school as that of supporting a half-time school health coordinator.

A major finding in this analysis was the relationship of Core Capacity to high school graduation. The graduation rates for students in schools with Core Capacity were higher for all groups of students than for students in schools without Core Capacity.

We selected this as a proxy because of the consistent research that cites the importance of having a school health coordinator and the ability to quantify the costs of this position.[ix,x]

TABLE 1

COST/BENEFIT (Lifetime unless otherwise noted)	OREGON	TOTAL (Oregon + U.S.)
Taxpayer Cost of Implementing School Health Core Capacity (for one year)	($18,861,795)	($18,861,795)
Benefit from Reduced Medicaid Enrollment	$6,131,177	$16,379,982
Benefit from Increased Tax Revenue	$8,012,997	$23,717,117
Benefit from Increased Household Earnings (Post-tax)	$80,926,190	$80,926,190
Benefit from Reductions in Crime	$3,814,812	$3,814,812
TOTAL Lifetime Benefit (2010 Dollars)	$98,885,176	$124,838,100
Projected Return on Investment from Implementing School Health Core Capacity	**$5.24:$1**	**$6.62:$1**

High school graduation is transformative for a population. The evidence for this is so strong that graduation from high school in four years is now a leading public health indicator for the nation.

Comparing this cost to our expected *lifetime benefits* in health, crime, income and tax revenue, **we expect between**

i. Freudenberg, Nicholas, and Jessica Ruglis. Reframing school dropout as a public health issue. *Preventing Chronic Disease: Public Health R*esearch, Practice and Policy. 2007; 4(4): 1-11. Available at www.cdc.gov/pcd/issues/2007/oct/pdf/07_0063.pdf. Accessed on 5/15/13.

ii. Robert Wood Johnson Foundation. Overcoming Obstacles to Health. 2008. www.commissiononhealth.org/PDF/ObstaclesToHealth-Report.pdf. Accessed 5/15/13.

iii. Alliance for Excellent Education. Healthier and Wealthier: Decreasing Health Care Costs by Increasing Educational Attainment. Washington, D.C.; November 2006. www.all4ed.org/files/HandW.pdf. Accessed 1/30/13. (Note: Oregon figure was adjusted for inflation and reported in 2010 dollars.)

iv. Basch, Charles E. Healthier Students are Better Learners: High-Quality, Strategically Planned, and Effectively Coordinated School Health Programs Must Be a Fundamental Mission of Schools to Help Close the Achievement Gap. Journal of School Health. 2011; 81(10): 650-662.

v. Ibid.

vi. Basch, Charles E. Healthier students are better learners: A missing link in school reforms to close the achievement gap. Journal of School Health. 2011; 81(10): 593-598.

vii. Ibid.

viii. Prata, Adriana, Robert Nystrom, Inge Aldersebaes, and Gary English. Healthy Kids Learn Better: Lessons Learned from Oregon's Coordinated School Health Project. Unpublished manuscript, State of Oregon Public Health Division and Department of Education. 2007.

ix. Taras, Howard, Paula Duncan, Doris Luckbill, Judy Robinson, Lani Wheeler, and Susan Wooley, eds. Health, Mental Health, and Safety Guidelines for Schools. American Academy of Pediatrics. 2004.

x. American Cancer Society, Inc. Improving School Health: A Guide to the Role of the School Health Coordinator. American Cancer Society. 1999.

xi. Davis-Kean, Pamela. The Influence of Parent Education and Family Income on Child Achievement: The Indirect Role of Parental Expectations and the Home Environment. Journal of Family Psychology. 2005; 19(2): 294–304.

xii. U.S. Department of Health and Human Services. Office of Disease Prevention and Health Promotion. Healthy People 2020. Washington, D.C. Adolescent Health Objectives. www.healthypeople.gov/2020/topicsobjectives2020/objectiveslist.aspx?topicId=2. Accessed 5/15/13.

HEALTHY SCHOOLS, HEALTHY STUDENTS, HEALTHY COMMUNITIES

> *"If medical researchers were to discover an elixir that could increase life expectancy, reduce the burden of illness, delay the consequences of aging, decrease risky health behavior, and shrink disparities in health, we would celebrate such a remarkable discovery. Robust epidemiological evidence suggests that education is such an elixir."*
>
> — Nicholas Freudenberg, Dr.P.H., and Jessica Ruglis, Ph.D., 2007[1]

Health and education are deeply connected. For many years, public health advocates have viewed educational achievement as a predictor of health risk behaviors (such as higher risks of smoking among adults with fewer years of formal education).[2] Increasingly, educational researchers are now documenting the impact of health problems on the ability of youth to achieve academically or graduate.[3] The cumulative research on this topic supports what teachers, parents, and health experts have believed for a long time: healthy students learn better, and students who succeed academically stay healthier.[4]

In Oregon, about two-thirds of students who enter high school graduate with a regular diploma in four years, but more than 4% of all students drop out each year.[5] This burden falls heaviest on youth of color and those from low-income families.[6] In addition, school dropout is occurring at an increased rate among younger students.[7] Multiple factors can contribute to students not completing their high school education, and schools are working to support students through improved teaching strategies. Public policy discourse has focused on the importance of the teacher and teaching quality as predictors of student success. While teacher quality is important, it is one of a number of factors that have been linked to student success. "Teaching harder" cannot be the only solution.[8] Schools also need support to ensure that students are physically healthy and feel well so they can be ready to learn. Some schools and communities have embraced these concepts but increasing budget cuts to education challenge even the most committed schools' abilities to sustain health related supports for students.

Increasingly, the importance of educational status as a major determinant of future well-being has led to the inclusion of high school graduation as a key public health indicator.[9] In fact, Healthy People 2020 — a list of national objectives for health improvement — includes high school graduation rate as a leading health indicator.[10] High school graduation is poised to be a shared indicator that allows for alignment between these two sectors.

The need for infrastructure and coordination to support school health has been repeatedly cited by researchers in both health and education.[11] A healthy school environment benefits students, staff and the broader community. It is beyond the scope of this paper to address other critical components of school health, perhaps most notably, staff wellness efforts. This report was created to strengthen the knowledge base connecting school health infrastructure and student level health and educational outcomes.

We approach this task by summarizing the status of K-12 public secondary schools' infrastructure to support student health in Oregon, and the benefits of having specific elements of school health capacity present in schools. The data in this report come from both published research reports and a new analysis of Oregon-specific data. Based on these findings, we offer estimates of a return on investment in school health by comparing the value of long-term benefits associated with improved graduation rates to a potential cost associated with increasing school-based health capacity.

WHAT ARE "HEALTHY SCHOOLS"?

> *"Establishing healthy behaviors during childhood is easier and more effective than trying to change unhealthy behaviors during adulthood. Schools play a critical role in promoting the health and safety of young people and helping them establish lifelong healthy behavior patterns."*
>
> — Centers for Disease Control and Prevention, Adolescent and School Health

Schools provide a suite of health services— some of which are mandated by law to address barriers to learning for specific student populations. For example, federal and state laws require that schools identify, evaluate and provide appropriate health services to students with chronic or special health needs, and provide support services necessary for a student to learn in the least restrictive environment. Other health services are more universal◊ in nature, such as mandates for physical education and nutrition standards for schools. In addition, schools may elect to implement health-related learning supports that are not mandated by law but have been shown to enhance the school environment, such as Positive Behavior Interventions and Supports. The literature provides extensive examples of other specific, effective school-based health interventions that some schools may implement.[12] These include efforts to reduce student tobacco use, improve nutrition, increase physical activity, reduce harassment and bullying and improve other aspects of health.

◊ Oregon Administrative Rule 581-015-2240 Requirement for Least Restrictive Environment

In this report, we define school health more broadly. The school health services and interventions described above are just one part of a comprehensive school health approach. Our definition of a healthy school encompasses the larger school environment, including the physical environment (buildings and grounds), social environment (school climate), school policies, curricula and engagement with the community.

As described by the Centers for Disease Control's Coordinated School Health Model, a comprehensive approach to school health includes the following elements:[13]

Healthy School Policies and Environments	Physically and emotionally safe school building and campus. Health-supporting policies are implemented and communicated.
Staff Wellness	Work-site health promotion programs that encourage and support staff in pursuing healthy behaviors and lifestyles.
Health Education	Kindergarten through 12th grade curriculum that provides students with opportunities to acquire the knowledge, attitudes, and skills necessary for making health-promoting decisions.
Physical Education	Kindergarten through 12th grade curriculum that provides the opportunity for students to gain the necessary skills and knowledge for lifelong participation in physical activity.
Nutrition Services	A before, during, and after school nutrition environment that promotes and provides balanced and nutritious meals and snacks in the cafeteria, classroom, and at school events.
Health Services	Student access to primary health care services. Qualified professionals, such as physicians, nurses, dentists, health educators, and other allied health personnel, provide these services.
School Counseling, Psychological and Social Services	Student access to mental, emotional and social health care services. School-wide resources for a supportive social and emotional school climate. Professionals, such as certified school counselors, psychologists, and social workers, provide these services.
Family and Community Involvement	Participation of these groups and youth in policy and program development and integration of community providers with schools.

However, the existence of each of these elements in isolation is not enough. Coordination is often identified as necessary to ensure that school health resources are used in a strategic and sustainable manner.[14] One approach to implementing effective school health programs is to develop basic infrastructure or capacity. This capacity is created by critical school health components that are recognized as being essential to sustainable, evidence-based school health approaches.[15] To create a working benchmark for essential school health capacity, we utilized measures from the Centers for Disease Control and Prevention's School Health Profiles Study. These measures reflect findings from national and state school health research.[16] For the purposes of this report we have named the concurrent existence of the following components Core Capacity for school health:

CORE CAPACITY FOR SCHOOL HEALTH

Staffing
A specific person in a school who is coordinating efforts designed to promote student health (e.g., School Health Coordinator).

School health self-assessments
Use of an evidence-based self-assessment tool that identifies areas where strengths exist and improvements are needed, and provides objective ways to measure progress (e.g., School Health Index).

Inclusion of a health goal and objectives in School Improvement Plan
Clearly articulated health improvement measures that hold a school accountable for promoting health and a healthy school environment.

School health group
A group (e.g., school health council, committee, or team) that offers guidance on the development of policies or coordinates activities on health topics. The inclusion of both high-level school leadership and community partners in the group enables resources to be utilized more efficiently in the school setting.

Strong administrative support, coupled with the critical school health components outlined above, empowers school personnel and partners to effectively support health and achievement on the school campus.[17] Having basic capacity at the school building level allows for flexibility as student and staff health needs change over time. The concept of Core Capacity is further explored in Section II of this report.

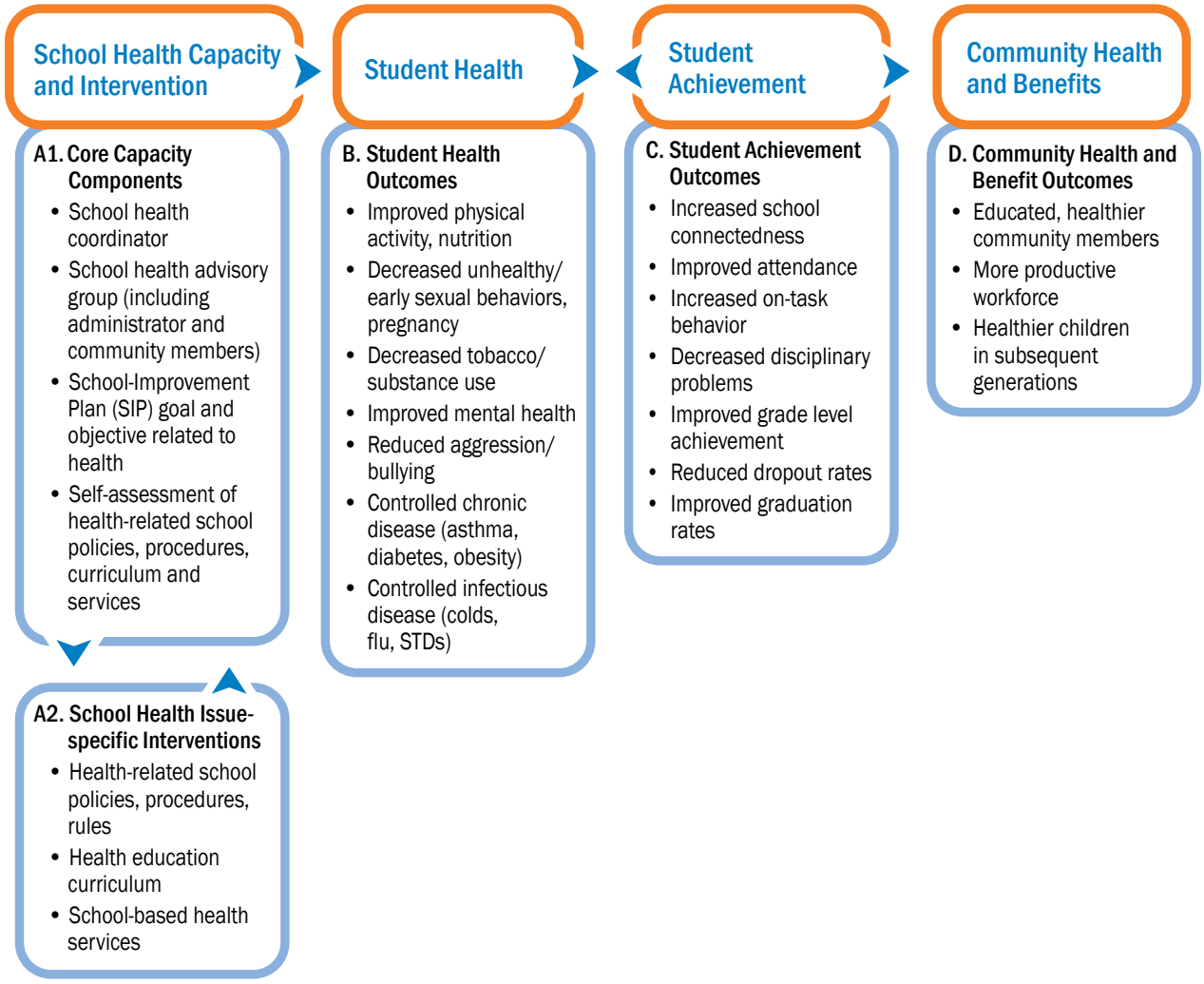
A simple logic model (Figure 1) shows how school health capacity and school-based health interventions (Boxes A1, A2) are expected to provide benefits to students and schools in terms of both health (Box B) and achievement (Box C), and long-term benefit to communities and the public (Box D).

Schools can approach school health capacity development from a variety of starting points. Based on Oregon's Coordinated School Health and School-Based Health Center work, we have found that there are two common scenarios that initiate the chain of events outlined in this document:

1. **The creation of Core Capacity supports the development and sustainability of coordinated and effective school health interventions.**

2. **The implementation of a targeted school health intervention can be a path to a broader assessment or realization of health-related barriers to learning. This can incite the creation of Core Capacity.**

FIGURE 1: SCHOOL HEALTH LOGIC MODEL



In the latter case, schools may begin this journey because a specific health topic was identified as a priority area to be addressed. Thus Boxes A1 and A2 are shown in our model as having a potential reciprocal relationship. The association between student health (B) and achievement (C) can also move in both directions (health influences achievement, and achievement can also influence health).

The association between school health and long-term public benefit (A-B-C-D) can be depicted more simply as a "chain of events" as shown in the logic model above.

Throughout the remainder of this report we use Oregon data and published research to provide evidence of the associations illustrated in our logic model or "chain of events," and to discuss the long-term economic value of improvements in community health and benefits.

The sections of the report describe this pathway as follows:

Section I describes the linkage between each independent point in the chain.

- School health capacity and interventions influence student health (Box A to Box B).
- Associations between student health and achievement (Box B to Box C), including a focus on specific populations of youth.
- Student achievement outcomes and long-term community health and benefits (Box C to Box D).

Section II of this report describes the linkage between basic elements of school health infrastructure or Core Capacity and each subsequent benefit.

- Building blocks of Core Capacity and the prevalence of this capacity in Oregon (prevalence of Box A elements).
- Associations between Core Capacity and student health indicators (Box A to Box B).
- Associations between Core Capacity and indicators of student achievement (Box A to Box C).
- Associations between Core Capacity and long-term community and public benefits (Box A to Box D).

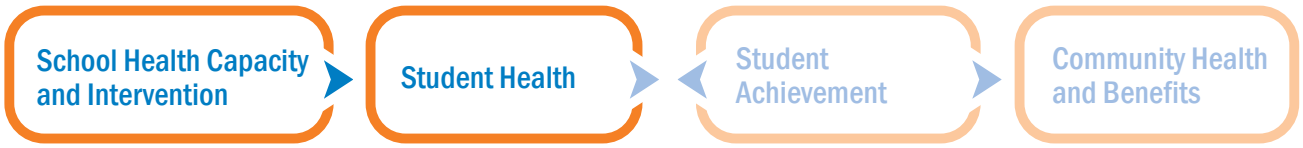
Section III of this report then provides information to summarize the expected economic return on investment from the development of Core Capacity.

- Estimated costs to build Core Capacity in Oregon.
- Estimated economic value of building Core Capacity in Oregon.

Finally, in the Appendix we provide a detailed methodology of our analysis, discuss limitations of our approach, and provide suggestions for further study.

SECTION I

LOGICAL LINKAGES BETWEEN SCHOOL, STUDENT AND COMMUNITY HEALTH



In this report we explore the step-by-step links between different points in the pathway from school health capacity to community health and benefits. The *What are Healthy Schools?* section of this paper provided a brief introduction to the concept of school health Core Capacity. We will revisit this concept again in *Section II: Associating Benefits with School Health Core Capacity*. In this section, we continue through our logic model by examining Oregon data on student health.

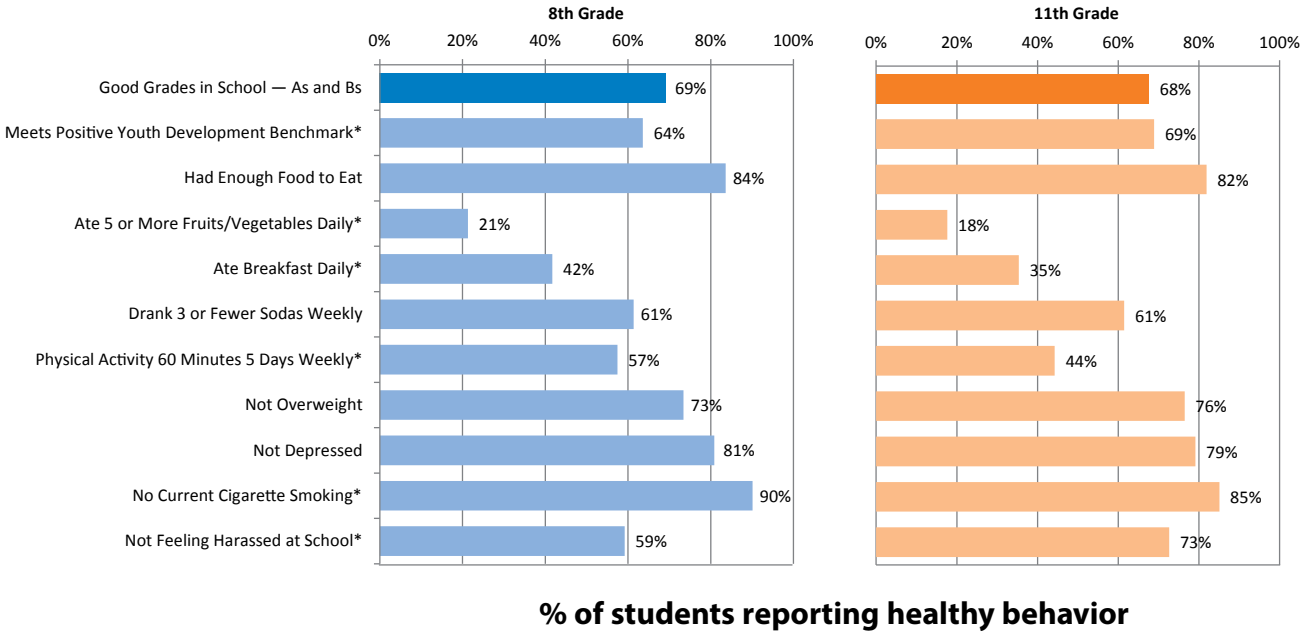
Student Well-Being and Health

Children and youth spend a large portion of their waking hours in school, making the school setting critical to supporting their healthy development. The Oregon Healthy Teens Survey (OHT) is an anonymous school-based survey of eighth- and 11th-graders that has been implemented annually or biannually for the past decade. Figure 2 (page 10) shows the prevalence of "healthy behaviors" or "healthy factors" reported by Oregon students in 2009. Although some healthy factors appear to be present for most youth (such as students having enough food to eat, and not smoking), others are present for only a minority of students (eating sufficient fruits and vegetables, eating breakfast daily, and getting sufficient physical activity).

One measure that has been developed in Oregon to summarize whole child wellness among youth is the *Positive Youth Development Benchmark*.

Positive Youth Development (PYD), also known as resiliency or developmental assets, is a philosophical and theoretical framework that emphasizes building on and cultivating strengths inherent in all youth, rather than minimizing or correcting risky or undesirable behaviors. PYD emerged as an alternative to reducing singular problem behaviors in youth as research began to show that many risk

FIGURE 2: PREVALENCE OF HEALTHY BEHAVIORS OR FACTORS AMONG OREGON STUDENTS



*=Differences between grades is statistically significant at p<0.05 for that healthy factor.

Source: Oregon Healthy Teens Survey, 2009. We used chi-square tests to determine whether there were differences in the presence of healthy factors by grade level.

behaviors were connected to one another, as well as to social and environmental factors.[19,20,21] In Oregon, PYD has been shown to be strongly associated with academic achievement and critical health behaviors such as nutrition and physical activity, substance use, sexual activity, mental health, suicide, and behavior at school.

The Oregon PYD Benchmark incorporates six components or measures often cited in PYD literature:[22]

- Self-rated physical health;
- Self-rated emotional/mental health;
- The presence of caring adults;
- Participation in community;
- Self-efficacy (youth being able to do most things if they try);
- Self-confidence.

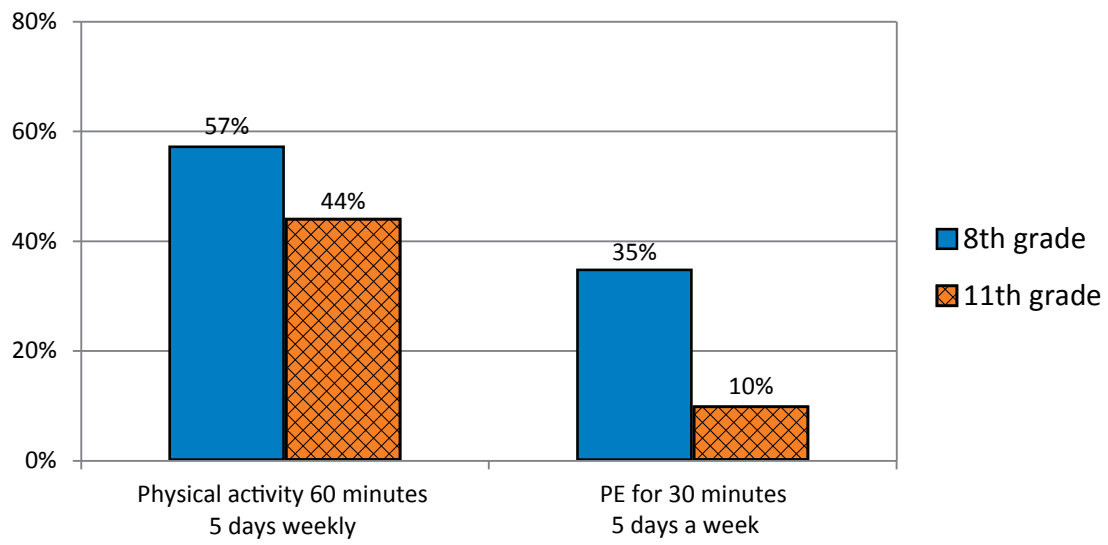
To meet the benchmark, youth need to answer five out of the six questions positively. Statewide, about two-thirds of youth in eighth and 11th grades are meeting the PYD benchmark.

This initial analysis highlights the presence of healthy behaviors among eighth- and 11th-graders in Oregon. Variations in students' healthy behaviors by grade may be the result of differences in a variety of domains such as:

- School-based programs or policy (e.g., food options in school cafeterias or vending);
- Growing independence (e.g., the ability to drive instead of walk, and purchase food); and
- Physiological and cognitive development (e.g., puberty, older students increased ability to accurately report their weight and height).

Significant differences were found between eighth- and 11th-graders across a number of health factors. For example, significantly fewer 11th-graders reported healthy eating and participating in the recommended amount of physical activity. Though a variety of factors may contribute to the differences between grades, changes in the school environment are especially noteworthy. Changes in opportunities for physical activity during the school day are likely to be contributing factors for the differences in physical activity between grades: 11th-grade students are significantly less likely than eighth-graders to have physical education (PE) classes five days a week and to exercise at least 30 minutes during PE classes (see Figure 3).

FIGURE 3: SUFFICIENT PHYSICAL ACTIVITY AND SCHOOL-BASED PHYSICAL EDUCATION (PE) PROGRAMS, 8TH AND 11TH GRADES



Source: Oregon Healthy Teens Survey, 2009. Data provided by 5,148 8th-grade and 3,479 11th-grade student respondents. Presence of both physical activity and PE programs is statistically different ($p<0.05$) between 8th and 11th grades.

Changes in PE offerings between grades also highlight the differential impact school health programming may have on low-income students.[23] When opportunities for physical activity during the school day (such as PE) are eliminated, students who have access to greater resources may be able to compensate for the lack of activity by participating in other activities outside of school. Students whose families have lesser means may have fewer opportunities for physical activity due to financial and transportation barriers and having fewer safe places to walk, bike and play in their communities. Disparities in health status and academic outcomes will be further explored in the *When School Health Matters More* section of this document.

Health Interventions in School Settings

Extensive research has established a solid evidence base for the effectiveness of a variety of health interventions implemented in school settings. Examples of evidence-based policies and practices are listed below.

School Policy and Multi-Component Interventions:

- Coordinated school health;[24]
- Air quality management;[25]
- Minimum nutrition standards for competitive foods;[26]
- School-based tobacco prevention (in combination with other interventions such as mass media, price increases and other community education programs);[27]
- Positive Behavioral Intervention and Support (PBIS), which sets expectations for student behaviors, teaches students about positive behaviors, reinforces positive behaviors, and provides intensive support for students with problem behaviors;[28]
- Hand-washing protocols;[29]
- School-based violence prevention programs.[30]

Health Services:

- Vaccination programs in school settings;[31]
- School-Based Health Centers, which can include medical care with preventive and psycho-social services;[32]
- School-based or linked dental sealant delivery programs.[33]

Curriculum and Targeted Programs:

- Comprehensive school-based physical and health education;[34]
- Social Emotional Learning;[35]
- School- or community-group-based comprehensive risk reduction interventions for HIV/AIDS, other sexually transmitted infections and pregnancy;[36]
- School breakfast programs.[37]

Many of these activities are already being implemented in Oregon schools.

While some schools have a great deal in place to support student well-being, without significant resources, the sustainability of these interventions

is at risk. For example, researchers or categorical grant programs may provide funds to schools to implement interventions on a specific health topic for a finite period of time; however, when the funding is gone there may no longer be support for schools to continue implementing a health intervention despite the evident benefits. Strategic approaches to promoting Core Capacity for student health supports (rather than disease- or health factor-specific approaches) would allow schools to prioritize health issues most relevant to their population, thus improving their effectiveness and return on investment.

MAKING THE LINK: HEALTHY KIDS LEARN BETTER

> *"[Children] ... who face violence, hunger, substance abuse, unintended pregnancy, and despair cannot possibly focus on academic excellence. There is no curriculum brilliant enough to compensate for a hungry stomach or a distracted mind."*
>
> — National Action Plan for Comprehensive School Health Education, 1992[38]

We know that communities can successfully implement school-based programs that provide health benefits to students. It is also important to understand that health interventions support the educational mission of schools.

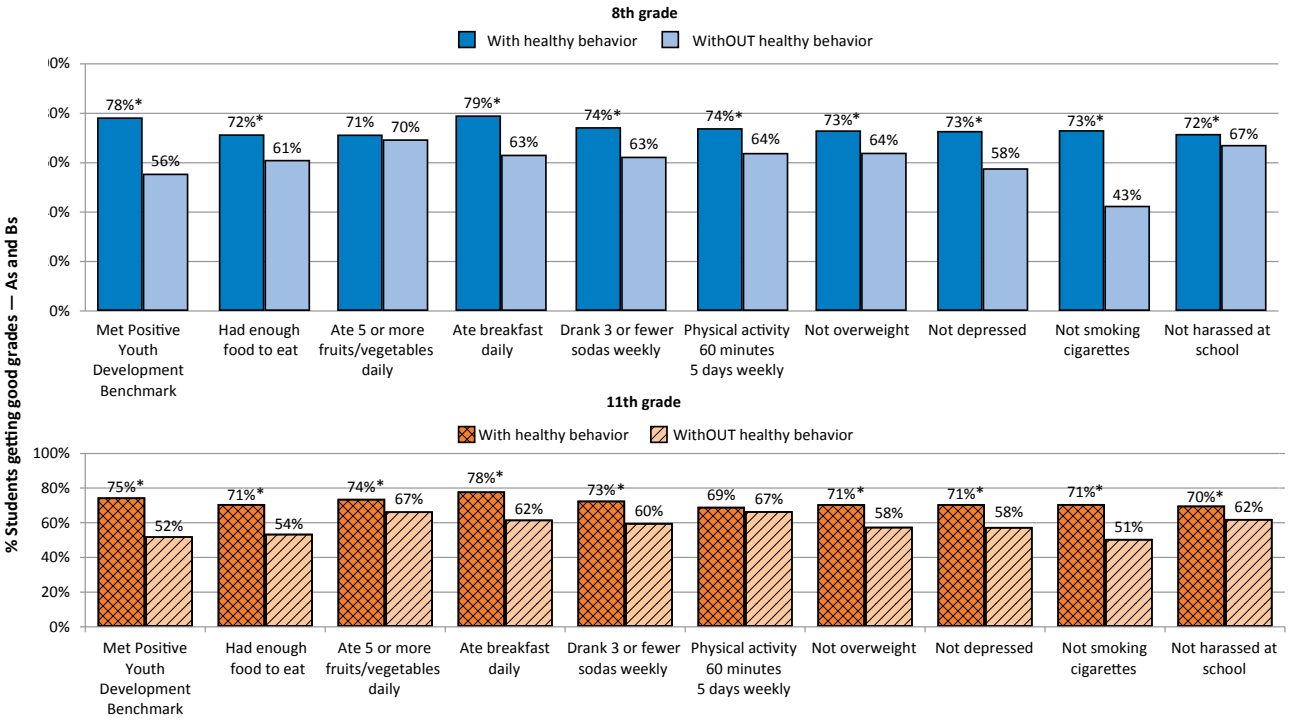
The Centers for Disease Control and Prevention (CDC) has provided a summary of the associations between student health and academics,[39] and other studies have comprehensively summarized this relationship as well.[40,41,42] Some associations between health indicators and achievement can work in both directions. For example, students who take up smoking may begin to struggle in school, but students who struggle may be more inclined to take up smoking. However many associations are clearly related in only one direction — struggling in school is highly unlikely to impact nutrition and hunger, and having poor oral health is unlikely to result from problems in school. Several examples of research that document the direction of associations between health and academic indicators are listed below:

- A recent research review conducted in Washington State specifically examined the direction of associations between multiple school health interventions and achievement. This review showed that improvement in achievement followed specific school health interventions.[43]
- A recent longitudinal study from Hawaii showed that student

depression affects academic achievement, especially among diverse populations.[44]

- Poor nutrition and hunger (including from skipping breakfast) has been definitively associated with poorer cognitive function, and school breakfast programs have been repeatedly shown to improve attendance (which is associated with school success).[45]
- Poorer oral health status is associated with dental pain, missed school and lower school performance among children.[46]

FIGURE 4: PERCENTAGE OF STUDENTS WITH GOOD GRADES IN SCHOOL BY PRESENCE OR ABSENCE OF HEALTHY FACTORS



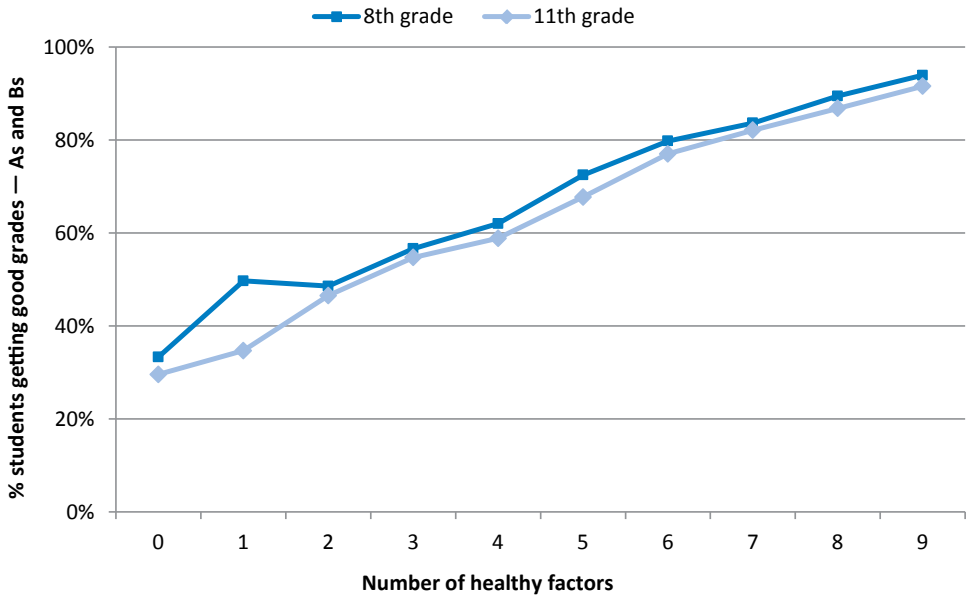
*Youth are significantly more likely ($p<0.05$) to have good grades **with** that healthy factor versus those that are **without** the healthy factor.

Source: Oregon Healthy Teens Survey, 2009. Data provided by 5,347 8th-grade and 3,545 11th-grade student respondents.

Oregon students are similar to those in the nation: students who are healthier also learn better. Figure 4 shows the percentage of students getting "good grades" (students who say they get mostly As and Bs in school) by whether they have healthy factors in place. Youth who have healthy factors are more likely to report getting good grades than youth who do not have healthy factors.

Furthermore, for each healthy factor present, the percentage of students getting good grades in schools increases (Figure 5). For both eighth- and 11th-grade students, the increase of each healthy factor was associated with approximately a seven percentage-point increase in the number of students who reported getting good grades in school. The increase in the percent of students who get good grades is consistent with the addition of each healthy factor, including when there are already a relatively large number of healthy factors present. This suggests that for each health factor that can be supported in the school environment, there may be an additive effect on a student's ability to succeed in school. In addition, the patterns of association are extremely similar for eighth- and 11th-graders, suggesting that health interventions are relevant for both age groups.

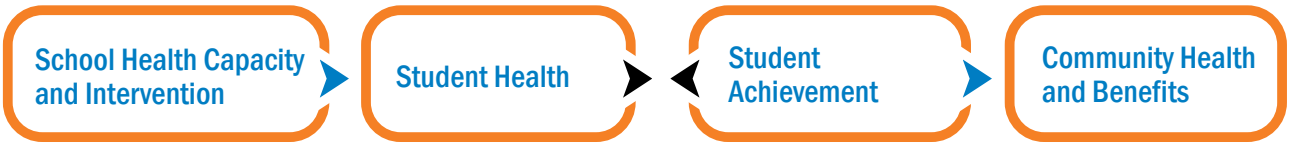
FIGURE 5: PERCENTAGE OF STUDENTS WITH GOOD GRADES IN SCHOOL BY NUMBER OF HEALTHY FACTORS



Source: Oregon Healthy Teens Survey, 2006-2009 combined. Data provided by 13,536 8th-grade and 14,925 11th-grade student respondents. Healthy factors include the sum of up to 9 factors: sufficient fruit/vegetable consumption, eating breakfast, drinking fewer sodas, sufficient physical activity, maintaining a healthy weight, not experiencing depression, not smoking cigarettes, not feeling harassed at school, and meeting the *Positive Youth Development Benchmark*. Having enough food to eat was not included here because this question was only asked on the 2009 survey. Using a linear regression model, the percentage of students getting good grades is significantly associated with the number of healthy factors ($p<0.001$) for students in 8th and 11th grades respectively. The question of differential impact of some health behaviors on grades is an area of further research.

WHEN SCHOOL HEALTH MATTERS MORE: LINKING HEALTH EQUITY AND THE ACHIEVEMENT GAP

> *"Recent research in fields ranging from neurosciences and child development to epidemiology and public health provide compelling evidence for the causal role that educationally-relevant health disparities play in the educational achievement gap that plagues urban minority youth."*
>
> — Charles E. Basch, Ph.D., 2011[47]



Addressing disparities in academic achievement is essential if we expect to have a significant impact on improving health equity.[48,49] However, health disparities — including but not limited to nutrition, oral health, asthma, exposure to violence, suicide, physical activity, and pregnancy — contribute to decreased academic achievement and a widening achievement gap.[50] The 2011–2020 Oregon Health Improvement Plan lists education attainment, specifically high school graduation, as an indicator of success in reducing health disparities.[51]

Core Capacity to support student health in schools may matter more for young people who are disadvantaged and have less access to resources than other students. Students from low-income families are more likely to have health risks that affect their academic achievement. These challenges can further diminish their chances at lifetime health and economic security. Schools will face the challenges—such as hunger, illness, and safety concerns—that children and youth bring each day. Developing supports to address non-instructional barriers to learning can equip schools to better educate all students.

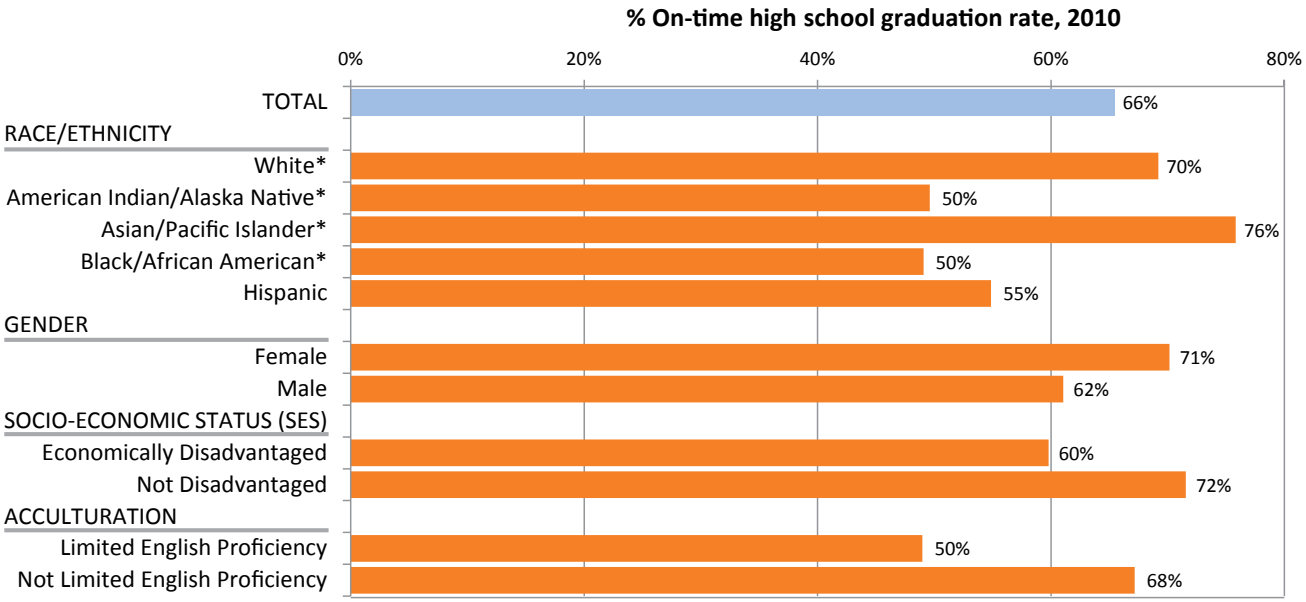
The school setting can provide access to services and supports that may not be available to some students elsewhere. For example, some families have resources to support their students' participation in community sports activities that require fees and reliable transportation. The presence or absence of school-based physical activity may have minimal impact for these youth. However, for students

whose families do not have these resources, the presence or absence of physical activity opportunities at school may have a profound effect on their access to healthy activities. This is equally true across a number of health supports including nutrition programs, school-based health services and health education.

Supporting students whose parents have not graduated from high school has an even more profound effect on their future well-being compared to students whose parents did graduate from high school. High levels of personal education can overcome disadvantaged family origins to achieve good long-term health. This research provides a clear example of the interplay between educational achievement and future health and well-being.[52]

In Oregon, disparities in high school graduation rates are present for economically disadvantaged students, racial and ethnic minority students, and students with limited English language proficiency (Figure 6).

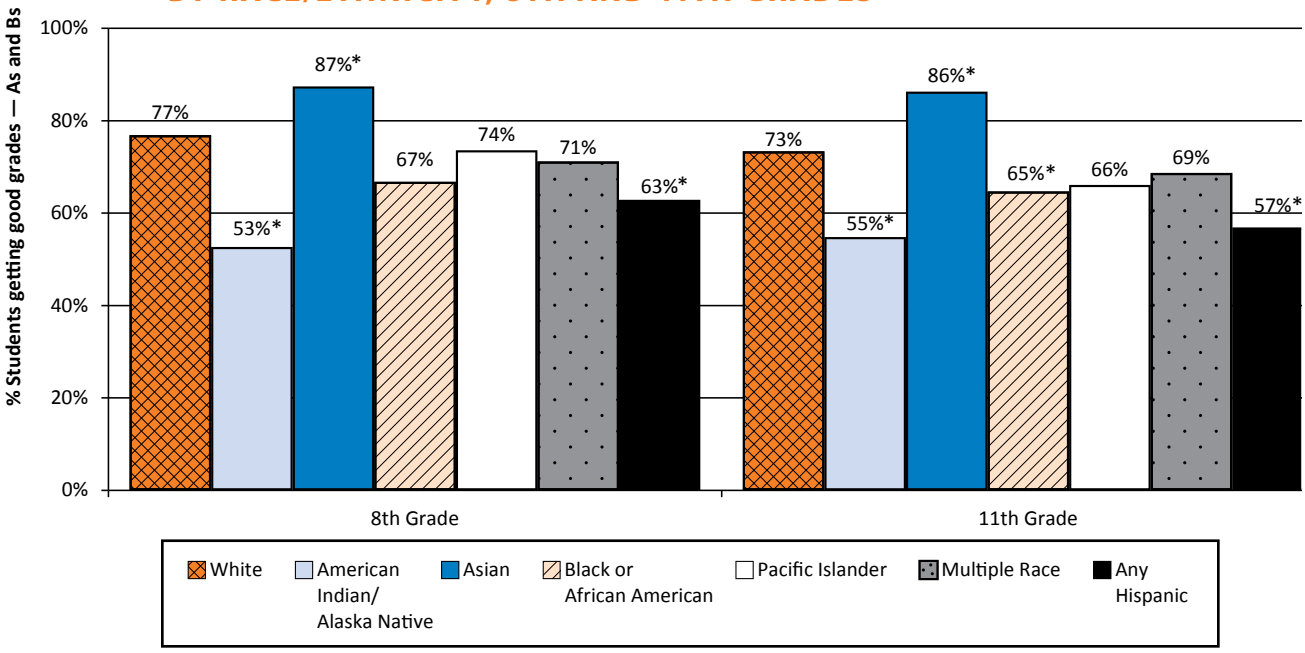
FIGURE 6: ON-TIME (4-YEAR) OREGON 2010 HIGH SCHOOL GRADUATION RATE, BY DEMOGRAPHIC FACTORS



*Non-Hispanic

Source: Oregon Department of Education, Graduating Class of 2009–2010.[53] "Economically disadvantaged" means that the student is eligible for or participating in the free and reduced lunch program, "limited English proficiency" is a designation applied to a student record and may or may not indicate that the student is enrolled in the English as a Second Language (ESL) program.

FIGURE 7: PERCENTAGE OF STUDENTS GETTING GOOD GRADES IN SCHOOL BY RACE/ETHNICITY, 8TH AND 11TH GRADES



All race categories are non-Hispanic (except where Hispanic is specifically indicated).

*Grades were significantly different at p<0.05 for youth in this race/ethnicity category compared to white non-Hispanic youth.

Source: Oregon Healthy Teens Survey, 2006–2009 combined. Data provided by 16,569 8th-grade and 16,833 11th-grade student respondents. At least 190 respondents are included in each race/ethnicity category per grade.

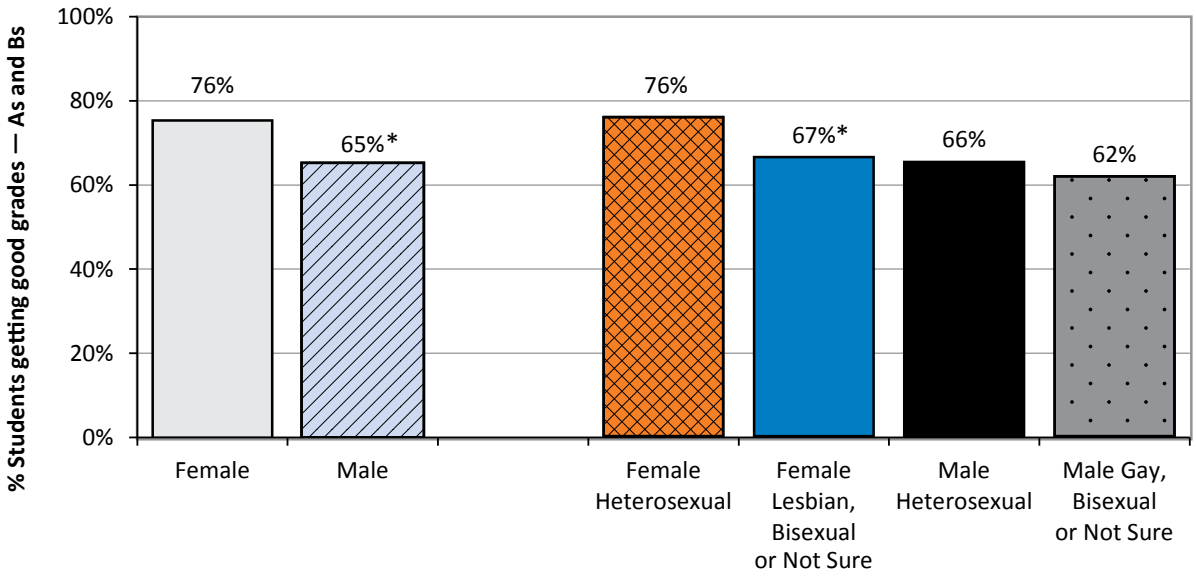
While self-reported economic disadvantage is unavailable in the Oregon Healthy Teens Survey, it is well known in the national literature that higher graduation rates are associated with higher family incomes.[54] In 2007, the high school dropout rate among persons 16-24 years old was highest in low-income families (16.7%) as compared to high-income families (3.2%).[55]

Generally, the patterns of on-time high school graduation (graduating within four years) by race and ethnicity (Figure 6) are similar to patterns of good grades (self-reported A and B grades) in school by race and ethnicity (Figure 7). A few differences in the available data on graduation rates and self-reported academic success are notable. While combined graduation rates for Asian/Pacific Islander students suggest that this group has the highest rate of graduation, disaggregated data on student-reported grades show that fewer Pacific Islander students report getting good grades than their Asian counterparts.◘

Graduation rates and self-reported "good grades" are higher for 11th-grade females than males (Figure 8). However, while graduation rates are not available by sexual orientation, self-reported student survey data show that female students who identify their sexual orientation as lesbian, gay, bisexual, or questioning are significantly less likely to report getting "good grades" than their heterosexual counterparts (Figure 8).

◘ Combined 2006–2009 Oregon Healthy Teens Survey.

FIGURE 8: PERCENTAGE OF STUDENTS WITH GOOD GRADES IN SCHOOL BY GENDER AND SEXUAL ORIENTATION, 11TH GRADE



*Percent of youth getting good grades was statistically significantly higher at p<0.05 in females vs. males and among heterosexual females vs. lesbian/bisexual/unsure females. The difference was not statistically significant in heterosexual vs. gay/bisexual/questioning males.

Source: Oregon Healthy Teens Survey, 2006–2009 combined data set. Data provided by 16,609 11th-grade student respondents. At least 350 respondents are included in any cell.

Not surprisingly, the patterns of disparity in academic success and graduation rate largely mirror those of health disparities. Figure 9 illustrates the association between healthy factors and good grades for 11th-grade students by race and ethnicity with points on lines that indicate the average number of healthy factors reported by each group.

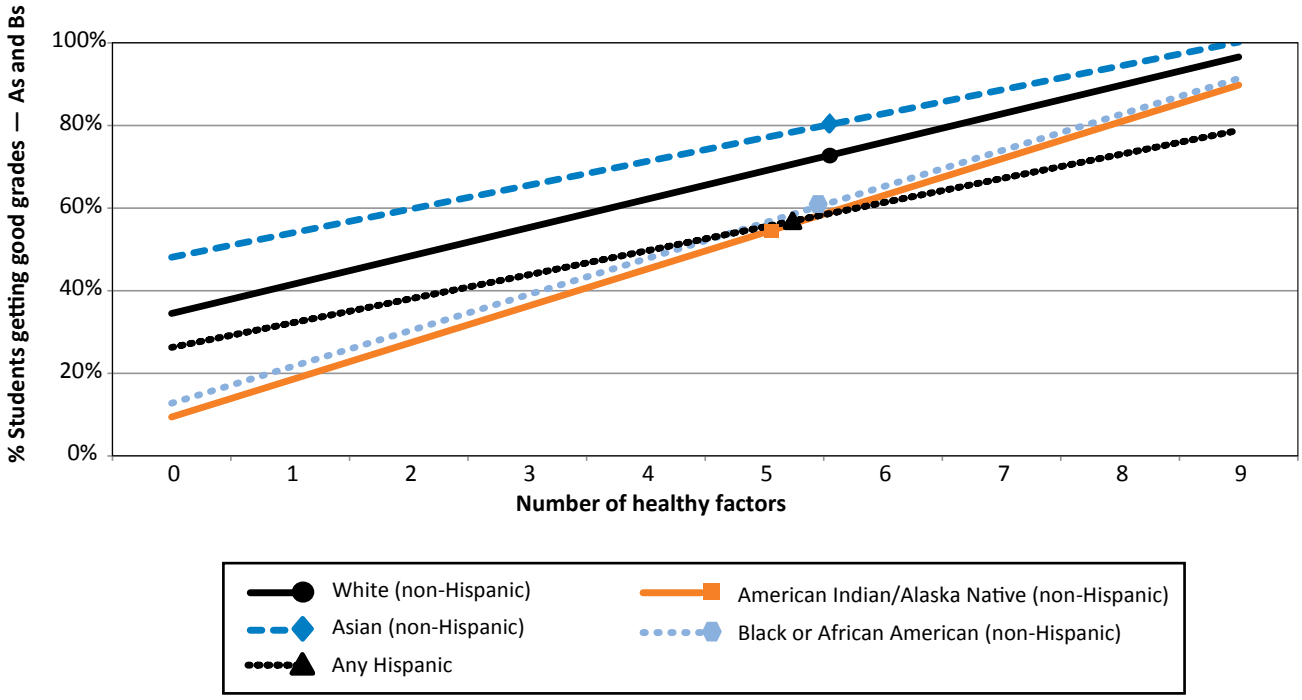
The pattern of association between healthy factors and good grades is the same for students, regardless of their race and ethnicity. American Indian/ Alaska Native, black/African American, and Hispanic students all report fewer average healthy factors, in comparison to white non-Hispanic students. Asian students are not statistically different from white non-Hispanic students in their numbers of healthy factors. While the academic achievement gap still exists among those with more healthy behaviors, it is narrower than it is for those with fewer healthy behaviors.

Notably, more Asian and white non-Hispanic students report getting A and B grades as compared to other racial/ ethnic groups, even when all groups report zero healthy behaviors. The different percentages of students getting good grades with equal numbers of health factors may be the result of other challenges such as lower socio-economic status, lack of culturally appropriate or readily accessible resources, or other stressors. These issues highlight the need for schools, families, and communities to work in partnership to identify health priorities and ensure that interventions are equitable and effective.

Similarly, students who reported their sexual orientation as lesbian, gay, bisexual or questioning had significantly fewer healthy factors than heterosexual students. Improving the number of healthy factors in these students' lives might be expected to reduce the achievement gap for sexual minority students (Figure 10).

Together, these findings add further evidence to the assertion that health disparities and achievement disparities are linked, and that addressing health disparities is one critical step in narrowing the achievement gap.

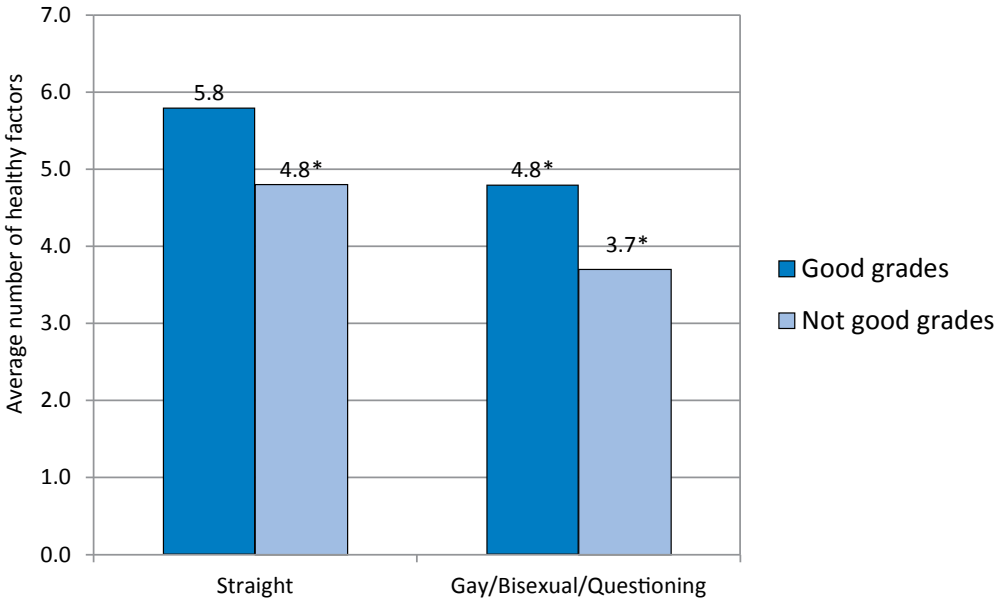
FIGURE 9: PERCENTAGE OF STUDENTS WITH GOOD GRADES IN SCHOOL BY HEALTHY FACTORS, AND AVERAGE HEALTHY FACTORS, BY RACE AND ETHNICITY, 11TH GRADE



Linear regression lines for association between healthy factors and good grades are shown. The dot marking on each line represents the average number of healthy factors within the group.

Source: Oregon Healthy Teens Survey, 2006–2009 combined data set. At least 200 youth included in each race group (see table in appendix for details). Results for Pacific Islander students are not shown due to small numbers. Statistical tests for differences in trend between minority and white non-Hispanic youth were not significant (in other words, slopes are statistically the same for different groups).

FIGURE 10: AVERAGE NUMBER OF HEALTHY FACTORS BY SEXUAL ORIENTATION AND GOOD GRADES, 11TH GRADE



*Average number of healthy factors is significantly lower (at $p<0.05$) compared to straight youth with good grades.

MAKING THE LINK: SUCCESSFUL STUDENTS CREATE STRONGER COMMUNITIES

"... hunger costs our nation at least $167.5 billion due to the combination of lost economic productivity per year, more expensive public education because of the rising costs of poor education outcomes, avoidable health care costs, and the cost of charity to keep families fed."

— Center for American Progress, 2011

School Health Capacity and Intervention → Student Health → **Student Achievement** → **Community Health and Benefits**

Academic achievement can take on many definitions, but here we focus on high school graduation as the measure of baseline academic success since we are able to make an association between Core Capacity and school-level high school graduation rates.

Graduating from high school has broad social and economic benefits. Graduates are more likely to be employed and earn higher wages than non-high school graduates.[56] High school graduates are less likely to become dependent on government assistance,[57] become involved in crime,[58] and to use substances such as tobacco, alcohol, marijuana and other illicit drugs.[59] An analysis done in Oregon found that high school dropouts were twice as likely to be incarcerated as high school

graduates, and African American male dropouts were five times more likely to be incarcerated than African American males who graduated from high school.[60] In addition, high school graduates' children are more likely to graduate from high school and to experience positive health outcomes as compared to children of non-graduates.[61]

Researchers and policymakers have focused on demonstrating and quantifying the benefits of high school graduation in a number of different domains, including:

Health Care and Social Welfare

- Medicaid and Medicare spending;
- Individual health care costs; and
- Social services spending.

Criminal Justice

- Incarceration costs;
- Individual productivity and earnings; and
- Victim costs.

Economic Capacity

- Individual income/earnings;
- Tax revenues; and
- Household spending.

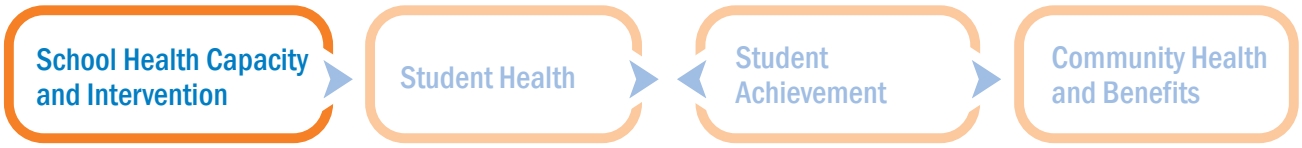
While the literature addressing these areas is varied in its scope and focus, it is extremely consistent with respect to the direction of change: increasing high school graduation rates decreases costs or increases benefits in each domain. While studies differ by jurisdiction, time span considered, and beneficiaries, economists, social scientists and education researchers are all in agreement that investing in academic success is a sound economic decision.

In Section III, we present an overview of some of the external literature that addresses the impact of high school graduation on these domains. We also present the results of our own internal Return on Investment (ROI) analysis that estimates the direct economic impact of an increase in the high school graduation rate. The ROI is presented in two ways: one, a local measure of costs and benefits that would accrue within Oregon; and two, a global measure that incorporates costs and benefits at the federal level.

SECTION II

ASSOCIATING BENEFITS WITH SCHOOL HEALTH CORE CAPACITY

> *"You need to have at least one person that is leading your team who is passionate about this topic... . I truly believe you are not going to get anywhere without that piece — if you do not have one person that can drive it."*
>
> — Oregon school principal, 2007



In this section, we explore associations between school health Core Capacity and each progressive step toward community health and benefits.

Do Oregon Schools Have Core Capacity for School Health?

The presence of Core Capacity was measured in 2010 using data from principals who participated in the CDC-sponsored School Health Profiles Survey, a survey conducted in Oregon's secondary schools.* We conceptualized Core Capacity for school health efforts by combining four independent components of school health capacity-building that are consistent with research-based ingredients for success. These components were selected because they are associated with effective and sustainable school health efforts. coordination and sustainability.[62]

1. Designation of a school health program coordinator:
   - School health coordinators "ensure synergy resulting from different efforts."[63]
   - Eighty percent of all Oregon secondary schools have a school health coordinator.
2. Conducting at least one school-based assessment for nutrition, physical activity and/or tobacco use:
   - Self-assessment supports school leaders to determine the extent to which schools are implementing evidence-based health policies and practices; it also allows for

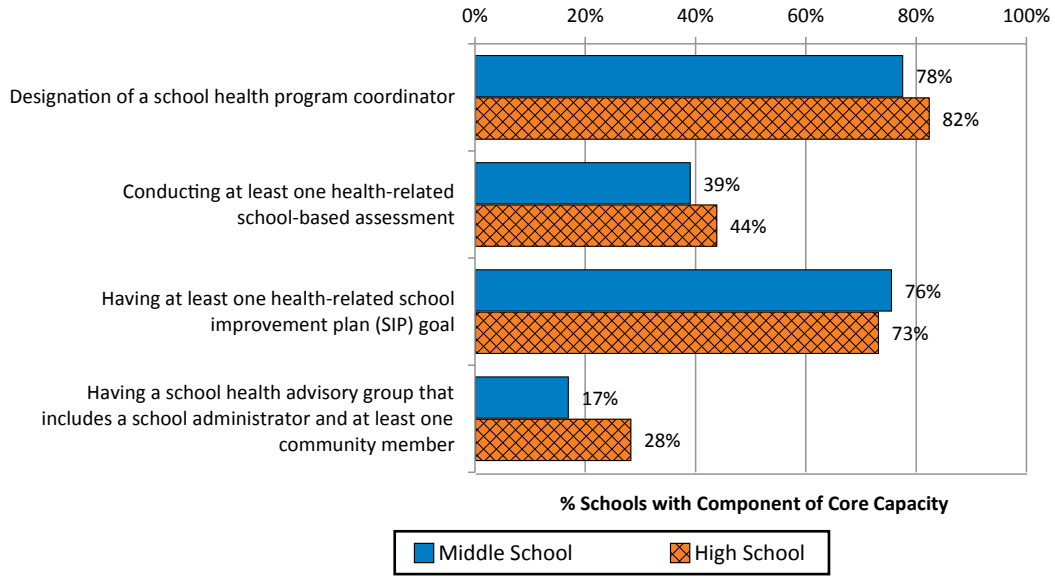
*The 2010 School Health Profiles Principal Questionnaire is available at: www.cdc.gov/healthyyouth/profiles/questionnaires.htm

the identification of weaknesses, and the development of plans for improvement while engaging stakeholders in the process.

- Forty-one percent of all Oregon secondary schools have conducted a formal health assessment.

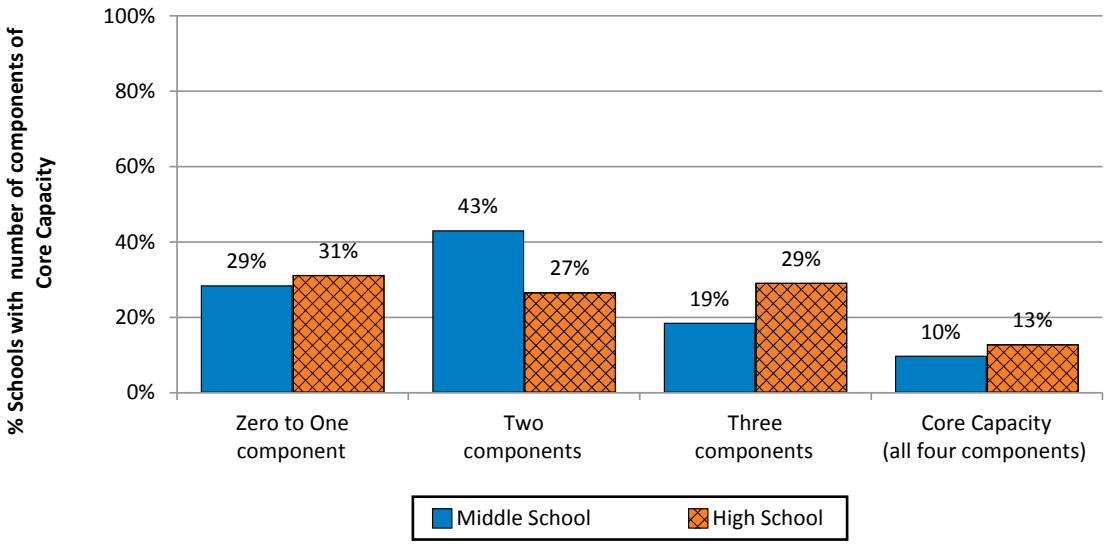
3. Having at least one health-related school improvement plan (SIP) goal:
   - School health goals should be imbedded into policy mandates and accountability measures to ensure that they are viewed as enabling factors for the educational mission of schools.
   - 75% of all Oregon secondary schools reported having at least one health-related SIP goal.
4. Having a school health advisory group that includes a school administrator and at least one community member (a parent, business, health department, faith community or other representative from outside the school):
   - School Health Advisory Councils ensure that there is broader support for school health activities. In addition the group can provide needed coordination and guidance in the selection and implementation of school health strategies.
   - Collaborative leadership provided by a school administrator has been shown to be the greatest contributing factor to the success of school health efforts. An administrative champion for school health can increase the visibility and importance of addressing health-related barriers to learning.[64,65]
   - Twenty-two percent of all Oregon secondary schools report having an advisory group with a school administrator and at least one community member.

FIGURE 11: PERCENTAGE OF SCHOOLS WITH EACH SCHOOL HEALTH CORE CAPACITY MEASURE



Source: Oregon School Health Profiles Survey, 2010; 126 middle schools and 106 high schools provided data in this survey.

FIGURE 12: PERCENTAGE OF OREGON SCHOOLS WITH NUMBER OF SCHOOL HEALTH CORE CAPACITY COMPONENTS



Source: Oregon School Health Profiles Survey, 2010; 126 middle schools and 106 high schools provided data for all the factors used to calculate Core Capacity in this survey.

Figure 11 shows the percentage of Oregon middle schools and high schools that reported having each of these components. The percentage of schools with a school health coordinator, as well as those with at least one health-related school improvement plan goal, were relatively high; the percentage of those conducting a health-related assessment and having a school health advisory group were relatively low. Patterns were similar for middle and high schools.

Figure 12 shows the frequency of the four components that comprise Core Capacity. Only about one in 10 (11.1%) Oregon schools had achieved Core Capacity in 2010. Some schools reported having three out of four Core Capacity indicators in place (23.0%), but the majority had only two out of four (36.2%) or zero to one (29.7%) components in place. High schools were slightly more likely to have three or four components of school health capacity. The most frequently missing component was having a school health advisory group that includes a school administrator and community member.

We explored differences in Core Capacity status by school size, socio-economic status of the student population (measured using percent free and reduced lunch program enrollment as a proxy for economic status), and urban/rural community location of the school. We did not find consistent patterns that indicated any of these factors was associated with having Core Capacity or not. This suggests that Core Capacity can be developed in any school setting.

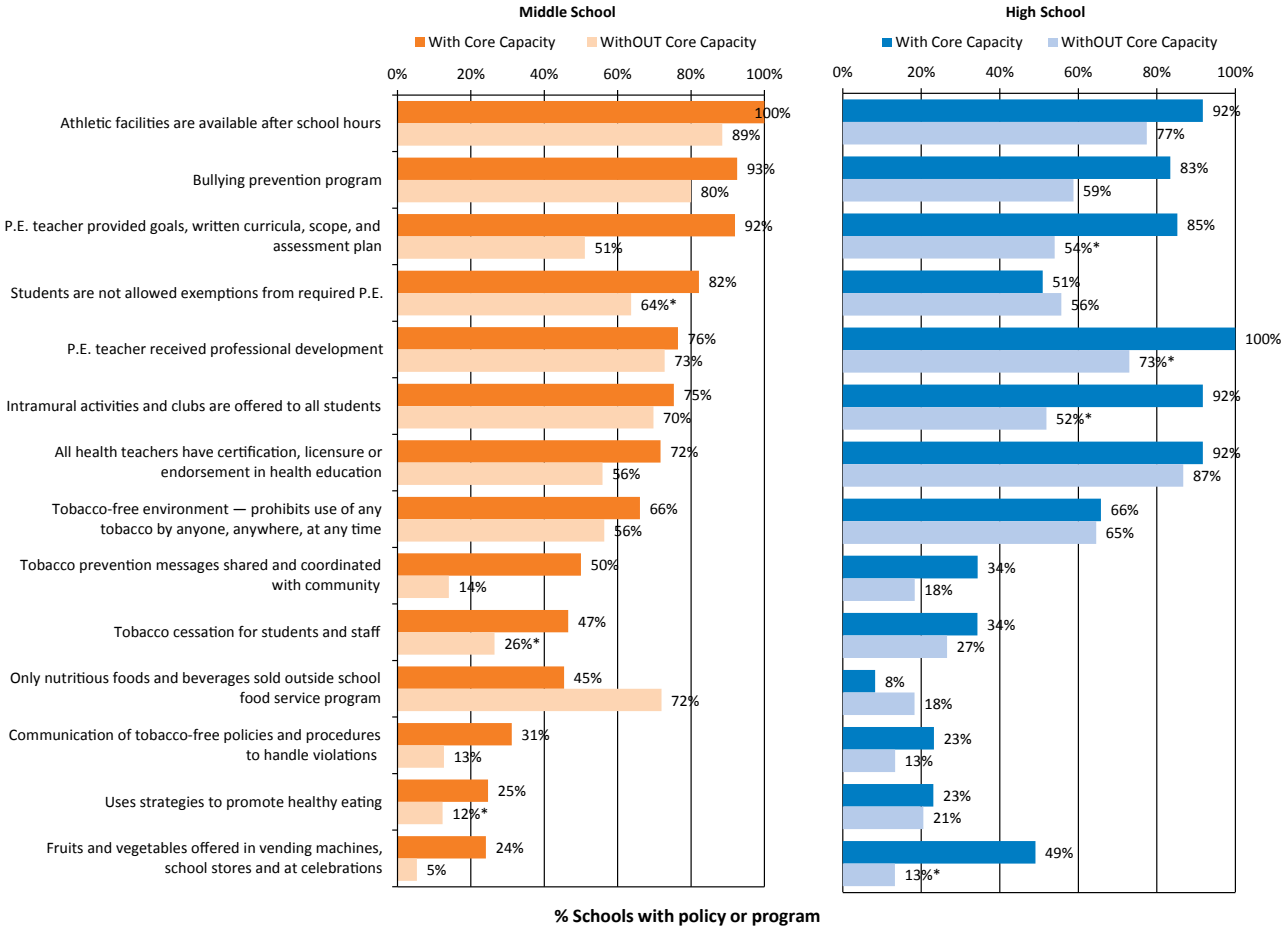
Core Capacity and Health-Promoting Environments in Schools

Next, we examined the association between Core Capacity for school health and the implementation of evidence-based school policies, procedures and

practices (Figure 13). Among schools with Core Capacity, we see an increased implementation of evidence-based policies and practices to support healthy school environments.

One notable exception in the general finding that schools with Core Capacity have healthier policies and programs was for competitive foods: for both middle and high schools, the schools with Core Capacity were *less* likely to have only nutritious foods served outside the school food service program (such as in-school stores, carts and vending). The reason for this finding is unclear.

FIGURE 13: PERCENTAGE OF OREGON SCHOOLS WITH EFFECTIVE HEALTH POLICIES OR PROGRAMS, BY PRESENCE/ABSENCE OF SCHOOL HEALTH CORE CAPACITY

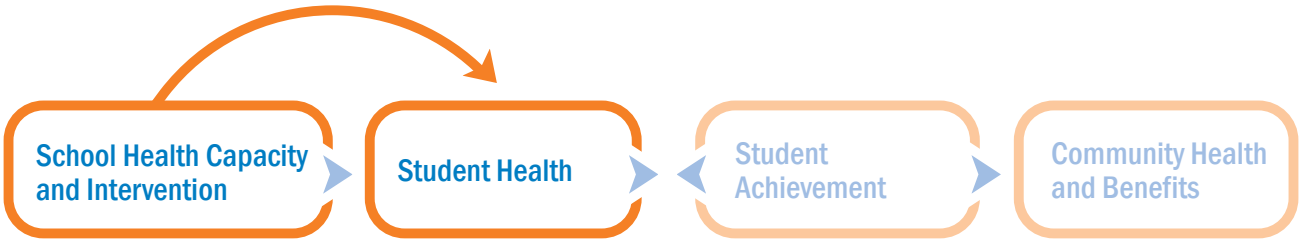


*Statistically significant at p<0.05

Source: Oregon School Health Profiles Survey, 2010; 126 middle schools and 106 high schools provided data in this survey.

DOES SCHOOL HEALTH CAPACITY LINK TO STUDENT HEALTH?

> *"Addressing both health behavior and academic achievement in a unified system would have reciprocal and synergistic effects on the health not only of children and adolescents, but also of adults in the U.S."*
>
> — Beverly Bradley and Amy Greene, 2013[66]



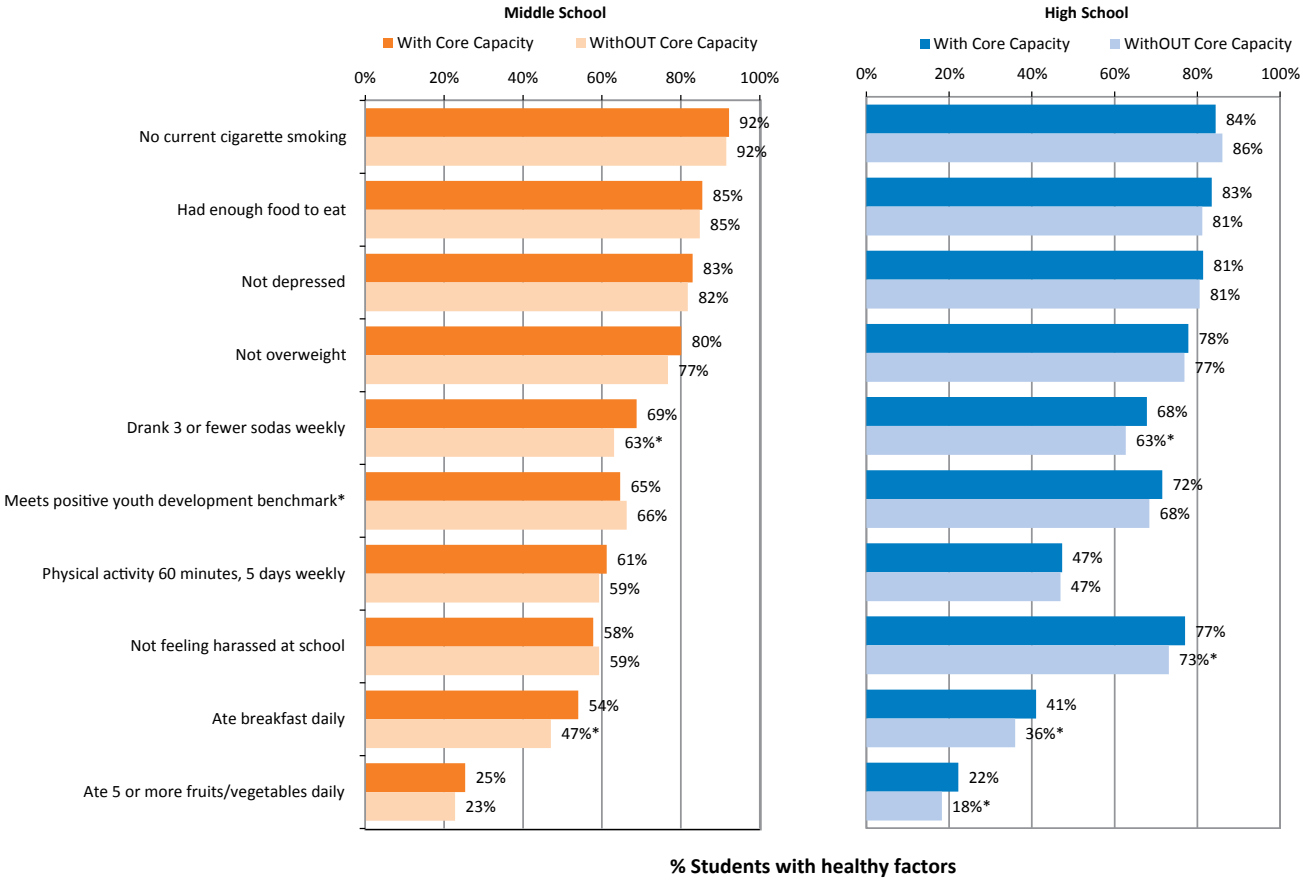
We next linked student-level information from the Oregon Healthy Teens Survey with school-level information from the Oregon School Health Profiles Survey, to examine associations between Core Capacity for school health and student behaviors.

Across health indicators, there were generally consistent associations between schools having Core Capacity and students having healthy behaviors. A statistically significant relationship was found between two indicators at the middle school level and four indicators at the high school level.

Not all student-level health factors were associated with the presence of Core Capacity, but this is logical because schools are not the *only* contributors to health behaviors among youth. Additionally, some statewide school interventions (such as bullying and tobacco prevention) have been widely promoted, so lack of logical association in these two areas may simply indicate that most schools have developed some capacity to address these issues outside the context of Core Capacity.

Students in schools with Core Capacity had a slightly higher number of healthy factors than students in schools without such capacity (5.7 versus 5.5). This difference was statistically significant, although it is uncertain whether achieving this level of improvement would lead to significant economic benefit.

FIGURE 14: PERCENT OF OREGON STUDENTS WITH HEALTHY BEHAVIORS/FACTORS, BY PRESENCE/ABSENCE OF SCHOOL HEALTH CORE CAPACITY



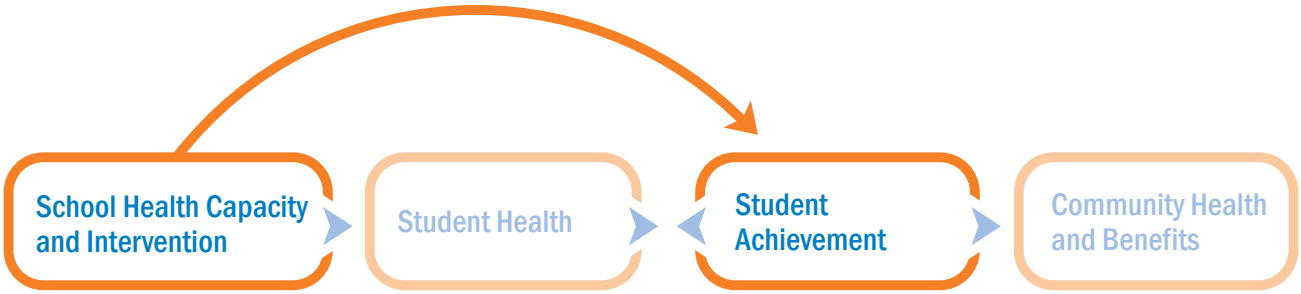
*Statistically significant at p<0.05

Source: Oregon School Health Profiles Survey, 2010, and Oregon Healthy Teens Survey, 2009, linked at school building level. Data were available from 4,257 middle school students in 33 schools, and 2,764 high school students in 26 schools. Significant associations present for 8th grade are “eating breakfast” and “drinking 3 or fewer sodas”; significant associations for 11th grade are “eating 5+ fruits and vegetables,” “eating breakfast,” “drinking 3 or fewer sodas” and “not feeling harassed.”

DOES SCHOOL HEALTH CAPACITY LINK TO ACHIEVEMENT?

"Despite compelling evidence linking health and academic achievement, there is no U.S. Department of Education initiative to reduce educationally relevant health disparities as part of a national strategy to close the achievement gap."

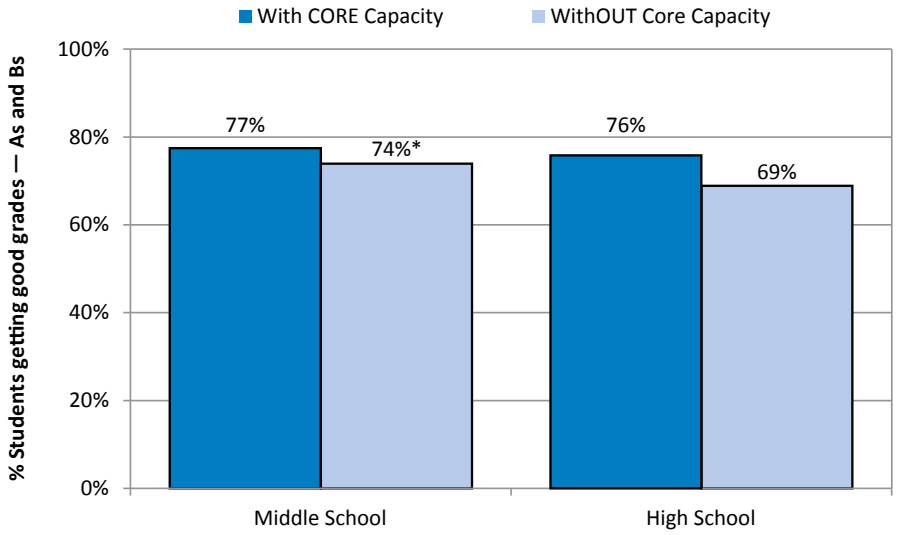
— Charles E. Basch, Ph.D., 2011[67]



Links to Good Grades

Next, using linked datasets that included student-level data from the Oregon Healthy Teens Survey, and school-level data from the Centers for Disease Control and Prevention's School Health Profiles Survey, we examined the percentage of students getting good grades (mostly As and Bs) by school health Core Capacity. For both middle schools and high schools, the percentage of students getting good grades was higher in schools that reported having the four components of Core Capacity. This relationship was statistically significant for high schools only.

FIGURE 15: PERCENTAGE OF STUDENTS WITH GOOD GRADES IN SCHOOL BY PRESENCE/ABSENCE OF SCHOOL HEALTH CORE CAPACITY



*Statistically significant at p<0.05

Source: Oregon School Health Profiles Survey, 2010, and Oregon Healthy Teens Survey, 2009, linked at school building level. Data were available from 4,257 middle school students in 33 schools, and 2,764 high school students in 26 schools. Core Capacity in schools was associated with "good grades" overall and for high school students alone, using a chi-square test for association.

Links to Discipline and Attendance

To further explore the associations between Core Capacity and student success, we linked school-level School Health Profiles Survey data with district-level administrative data from the Oregon Department of Education that described attendance policy violations (truancy) and disciplinary actions. School-level measures of truancy and disciplinary actions were not available.

We calculated adverse administrative events and report them "per 100 students" (to account for school enrollments):

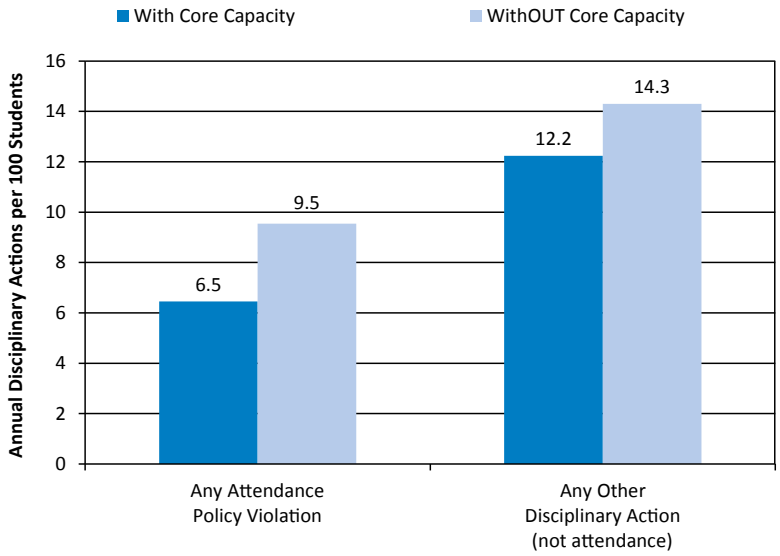
- Attendance policy violation (eight unexcused absences over a four-week period);
- Any disciplinary action (expulsion, in-school suspension, out of school suspension).

We used mean comparisons and regression models to explore associations between rates of these events (district-wide) and the presence of Core Capacity at the high school.

Over the period of a school year, schools with Core Capacity were in districts that had an average of three fewer attendance policy violations per 100 students per year than schools without Core Capacity (Figure 16). For disciplinary actions, high schools with Core Capacity were in districts that had an average of four fewer actions per 100 students per year than schools without that capacity.

Although associations were not statistically significant, the general direction is consistent with associations between Core Capacity and students' self-rated performance. In school districts where schools have Core Capacity, the rates of attendance policy violations and serious disciplinary events are lower. Taken together with other findings, the results support the conclusion that Core Capacity may contribute to greater student success.

FIGURE 16: ANNUAL DISTRICT-LEVEL ATTENDANCE AND OTHER DISCIPLINE VIOLATION RATES (PER 100 STUDENTS), BY PRESENCE/ABSENCE OF SCHOOL HEALTH CORE CAPACITY IN OREGON HIGH SCHOOLS



*Statistically significant at p<0.05

Source: Oregon School Health Profiles Survey, 2010, and Oregon Department of Education Discipline Incidents Collection System, 2010–2011, linked at school district. District-level data about attendance and disciplinary problems were linked with data from the 2010 Profiles Survey for 104 high schools with more than 50 students. An attendance policy violation means that a student had 8 unexcused absences over a 4-week period.

Links to High School Graduation

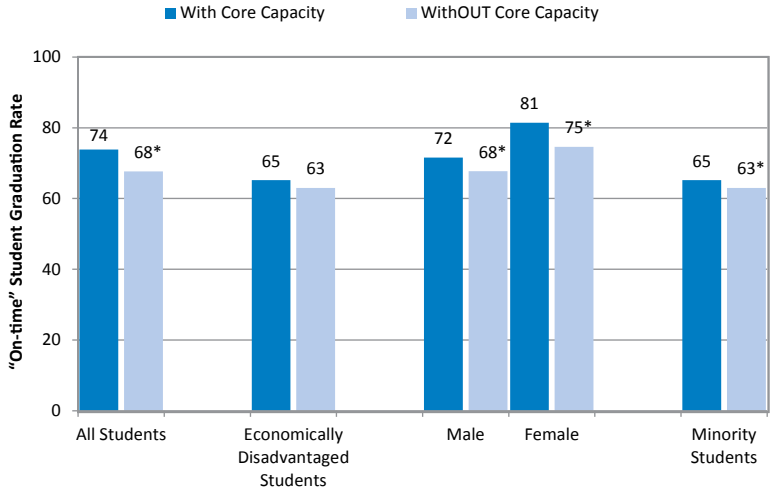
We continue this analysis by examining the connection between Core Capacity and high school graduation. We linked school-level information from the School Health Profiles Survey and school-level information about "on–time" graduation rates (from the Oregon Department of Education) to determine if there are associations between school health Core Capacity and high school graduation. We did this analysis for the graduating class of 2010, both for students overall and for several sub-groups of students (Figure 17). The graduation rates for students in schools with Core Capacity were higher for all groups of students than for students in schools without Core Capacity. However, the magnitude of the increase varied by sub-group: general population students (7% higher), males and females (6%–8% higher), minority youth (4% higher), and

economically disadvantaged students (2% higher).

The lower difference in graduation rates associated with Core Capacity for economically disadvantaged and, to a lesser extent, minority students is troubling, and may be the result of larger equity issues. While Core Capacity for school health helps schools and students overall, it cannot address all the challenges faced by students who are economically disadvantaged. In fact, some highly successful health programs have struggled with specifically improving the health of low SES populations.

For example, well-funded state tobacco control programs have acknowledged that more specialized interventions are needed to effectively reach low SES groups because of competing challenges those students face.[68] Core Capacity does help low SES students but it is not a panacea. We acknowledge that in this report we have set high school graduation as a bar for "success." However, academic achievement is only one measure of success. School capacity to address the health needs of students is likely to provide benefits beyond graduation such as meeting basic needs and supporting healthy development.

FIGURE 17: ON-TIME (4-YEAR) GRADUATION RATE, BY PRESENCE/ABSENCE OF SCHOOL HEALTH CORE CAPACITY IN OREGON HIGH SCHOOLS†



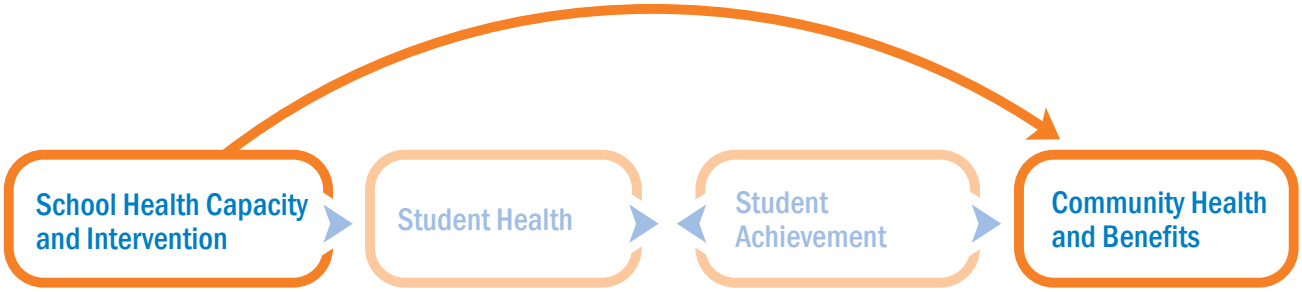
Source: Oregon School Health Profiles Survey, 2010, and Oregon Department of Education Graduation Reports (class of 2010), linked at school district level. "Minority students" include Hispanic, African American, American Indian, Asian, and multiple race students combined. A total of 104 high schools with at least 50 students in 75 districts had linked data from the 2010 Profiles Survey and information about graduation rates by demographic group. Differences in graduation rates at the student level were statistically significant at $p<0.05$ for all students, and for each subgroup except for economically disadvantaged students.

†It is worth noting that, as a whole, the 104 schools in our random sample of Oregon high schools had a higher average graduation rate than all Oregon high schools regardless of Core Capacity status (total graduation rate for Oregon was 67.3% versus 71.9% in our sample). Reasons for this are unknown; however, we do not think it changes the underlying theory of our analysis. If anything, starting from a lower baseline graduation rate allows for the possibility of greater improvement.

SECTION III

ESTIMATING THE ECONOMIC VALUE OF CORE CAPACITY

> *"Instead of just continuing to do things we've done in the past, we have an opportunity to revisit systems that were developed 40, 50, 60, 70 years ago — education, health care, even our approach to economic development ..."*
>
> — Governor John Kitzhaber, 2013[18]



Does School Health Core Capacity Link to Stronger Communities?

Strong communities support the health and well-being of all Oregonians. There are many ways to quantify community strengths. For the purposes of this analysis, we focus on the potential economic benefits in health care spending, tax revenue and individual earnings, and crime spending that could result from supporting more students to graduate from high school by investing in Core Capacity.

While we saw a 7% higher graduation rate for students who were in schools with Core Capacity, we will be using a conservative 1% graduation increase for our analysis.

A 1% increase in the 2010 Oregon public high school graduation rate equates to 502 additional graduates.

We begin with a brief overview of relevant literature on the economic benefits of increasing high school graduation related to health care, crime and economic capacity. Then, we outline the method we used to develop an ROI analysis using Oregon-specific data. The ROI methodology begins with a discussion of the costs involved in implementing Core Capacity, followed by an explanation of how we applied state and national data to estimate the benefits in each domain (health care, crime and economic capacity) of increasing high school graduation through investment in Core Capacity.

Economic Benefit of Increasing High School Graduation: Background Literature

Before detailing our own analyses, we present some relevant data from the literature on the economic benefits of increasing the high school graduation rate. While the magnitude of these benefits varies greatly depending on the particular outcome, methodology and timeline, they all come to the same conclusion: investments in improving high school graduation rates are sound.

In the health care arena, a recent study followed students with diabetes over a 14-year period and found that the high school dropout rate among people with diabetes was 6% higher than among non-diabetic peers, and that the likelihood of attending college was 8%–13% lower. The researchers estimated that over a lifetime a person with diabetes could lose more than $160,000 in wages as a result of the disease.[69] Another research effort estimated that for every avoided high school dropout, the state of Oregon would save $14,192[70] in reduced expenditures for Medicaid and uninsured care over the course of a student's lifetime.

In the area of crime, high school graduates are much less likely to be incarcerated than people who did not graduate from high school. Approximately 80% of Oregon's more than 14,000 current prison inmates did not graduate from high school and each costs an average of $23,000 per year to sustain.[71] A 2006 study estimated state-by-state savings derived from a reduction in crime and increase in household income associated with a 5% increase in the rate of males graduating from high school. The authors estimated that for every 5% increase in the high school graduation rate of Oregon males, there would be an *annual* savings of $21 million due to crime reduction, and a $30 million increase in *annual* earnings. This converts to an estimated $39,295 economic benefit per new male graduate in Oregon.[72] Another study estimated the lifetime cost savings per graduate from reduced criminal activity to be $26,566 (with males generating about three times the savings of that of females).[73] By this estimate, if Oregon raised its graduation rate by 1% (502 new graduates), $13.3 million in savings would be generated from reductions in criminal activity.

With respect to tax revenue and earnings, U.S. Census Bureau data consistently show that individuals with a high school diploma have significantly higher incomes than those who did not graduate. In 2010, the difference was more than $6,000 per year. A recent report on the impact of halving the dropout rates in Oregon presented several measures of economic benefit including income, spending capacity and economic growth. That analysis estimated that, in an average year, a halved dropout rate would produce $59 million in increased earnings, $7.1 million in increased auto sales, and $4.7 million in increased tax revenue. In addition, it would lead to the creation of about 500 new jobs and a $72 million increase in the gross state product by the time the new graduates reached their career midpoints.[74] The scope of these benefits is more expansive than the approach we used in our ROI but is nonetheless important to present as another benchmark measure. On the state level, one study estimated that if all Oregon heads of households were high school graduates in 2005, Oregon's collective household wealth would have increased by more than $750 million.[75] These higher wages and accumulated wealth would result in increased tax revenue which could translate to greater capacity for public investment.

Each of these estimates provides some valuable information about what we might expect in Oregon if we were able to achieve an increase in our high school graduation rate. While we could have chosen to combine these data in some way to generate a savings estimate, we decided for a variety of reasons to undertake our own ROI analyses. First, it was sometimes difficult to get exact details on the underlying methodology of the literature-based estimates and we wanted to make sure we understood exactly what assumptions were made and what our numbers were based on. Second, we wanted to use Oregon-specific data that was as recent as possible; some of the literature estimates were based on national data and/or figures from more than 10 years ago. Lastly, we wanted to make sure we could have numbers that were presented in compatible units of analyses so that they could be easily combined. In undertaking these analyses, we hope to provide a realistic but conservative estimate of the likely return on investment from investing in Core Capacity.

Estimating Costs to Implement Core Capacity

The components of Core Capacity identified in this report are challenging to economically quantify. They are the product of a number of factors, perhaps most notably vision, leadership and time. Time constraints have consistently been cited as a leading barrier to increasing Core Capacity by schools participating in Oregon's Coordinated School Health Program. When school leadership is supportive of school health efforts, the presence of a school health coordinator is a key enabling factor for fostering the development of Core Capacity.

This analysis uses the costs associated with supporting a half-time school health coordinator as a proxy for the costs of the

development of Core Capacity. We selected this as a proxy because of the consistent research that cites the importance of having a school health coordinator[76,77] and the ability to quantify the costs of this position. While there are nominal costs associated with the activities of the other Core Capacity measures, it is arguable that with a dedicated coordinator those activities are more likely to occur with existing resources and structures. The importance of the coordinator position is especially apparent as funding cuts to education and a poor economy have resulted in more students with more needs being served by fewer adults on school campuses around the state.

Our analysis is unlike a strictly traditional Return on Investment analysis since our cost estimate represents a proxy measure and is not tied to a definite source or intervention. Funding for this type of position could come from a variety of sources; local, state and federal dollars can all be considered. Regardless of the funding source, it is likely that any money would be considered taxpayer dollars. Thus, we consider the costs (and benefits) to taxpayers associated with implementing Core Capacity statewide.

As of 2010, Oregon had 1,270 public schools in 197 school districts serving more than 560,000 students in grades K-12.‡ Of these, 620 schools serve primarily students in grades 6 through 12.

The average mid-scale salary for a full-time masters-level teacher in Oregon was $45,070§. Adding in benefits and other fringe costs for a 0.5 FTE brings the cost to an estimated $30,422 per staff.*,[78] As one estimate of the cost to build Core Capacity, if all 620 secondary schools in Oregon obtained funding for a half-time dedicated staff person to coordinate school health efforts to build Core Capacity, the total cost to taxpayers would be approximately $18.9 million per year.

In this estimate, we are only considering implementation of Core Capacity in secondary schools, because these are the schools for which we have data to describe current implementation of school health and student health factors (from the School Health Profiles Survey, which is conducted among Oregon's secondary schools, and from the Oregon Healthy Teens Survey, which is conducted among eighth- and 11th-graders), and therefore these are the schools for which we have been able to explore potential benefits from Core Capacity. Potentially, there are also benefits at the primary school level that are outside the scope of this analysis.

‡From Oregon Department of Education Statewide Report Card, Fall 2011. www.ode.state.or.us/search/page/?id=1821

§All amounts have been converted to 2010 dollars.

*Assuming a 35% fringe benefit rate based on district funding reports available at www.ode.state.or.us/sfda/reports/r0091Select2.asp

Estimating the Economic Return from Investing in Core Capacity

In Section II, we discussed the relationship between high school graduation rate and school health Core Capacity, where schools *with* Core Capacity had a 7.1% higher graduation rate than those schools without Core Capacity. We acknowledge that this 7% difference may be due to a wide array of social, educational and demographic differences, only some of which are directly related to having full Core Capacity. For the class of 2010, school health Core Capacity in all Oregon schools would be predicted to result in more than 3,500 additional graduates (7.1% of 50,170 students in an average** student year cohort). However, because we are not attributing full causation of the increased graduation rates to the presence of Core Capacity, this Return on Investment analysis is based on a 1% increase in high school graduation rate (an estimated 502 students in 2010). Not only is this a simpler frame, but also it has the added benefit of being more attainable and easier to quantify.††

The table below provides a high-level summary of the results of both levels of our ROI analysis; a detailed explanation of how our internal calculations were computed is provided in the Appendix.

TABLE 1: SUMMARY OF RETURN ON INVESTMENT ANALYSES (OREGON AND TOTAL)

LIFETIME‡‡ COST/BENEFIT (UNLESS OTHERWISE NOTED)	OREGON	TOTAL (OREGON + NATIONAL)
Taxpayer Cost of Implementing School Health Core Capacity (for one year)	($18,861,795)	($18,861,795)
Benefit from Reduced Medicaid Enrollment	$6,131,177	$16,379,982
Benefit from Increased Tax Revenue	$8,012,997	$23,717,117
Benefit from Increased Household Earnings (Post-tax)	$80,926,190	$80,926,190
Benefit from Reductions in Crime	$3,814,812	$3,814,812
TOTAL Lifetime Benefit (2010 Dollars)	$98,885,176	$124,838,100
Projected Return on Investment from Implementing School Health Core Capacity	**$5.24:$1**	**$6.62:$1**

‡‡"Lifetime" = 46 years; i.e., between the ages of 19 and 64.

** "Average graduating class" estimated using numbers of students in cohorts for graduating classes of 2008–2010.

††Our estimate of costs and benefits includes the 14 schools with "current" (2010) Core Capacity. Because we are talking about having a stable, systemic funding source, it seemed appropriate to include their costs. Removing them from the benefits calculation would introduce an additional measure of complexity and would have an extremely neglible impact on the final ROI estimate.

We consider this to be a fairly conservative analysis for reasons noted throughout our subsequent discussion. But even so, we estimate that if schools were able to get even a 1% increase in graduation rates from implementing Core Capacity, Oregon taxpayers would reap $5.24 over the lifetime for each dollar invested.

Return on Investment Analysis: Oregon and National

Health Care

In calculating our own estimate for projected savings from reduced Medicaid expenditures, we came up with a very similar figure to what is found in the literature for state savings. Based on the difference in Medicaid enrollment between adults who are high school graduates versus those who are not, and the average annual cost of an adult Medicaid enrollee, we projected a 1% increase in the graduation rate would result in baseline year state savings of $119,345 and federal savings of $318,841. Projected over the lifetime, this adds up to $6,131,177 saved at the state level and $16,379,982 at the federal level. We were not able to recreate our own estimates of savings from reducing rates of the uninsured. However, Oregon would be able to recoup 33% of the taxpayer cost of implementing Core Capacity just from reducing Medicaid expenditures alone, while the inclusion of federal savings raises that to 86%.

It is noteworthy that there are several state and federal policy initiatives currently being implemented that could impact the ROI calculations presented here. Provisions of the Affordable Care Act have the potential to greatly increase the number of individuals eligible for Medicaid. In Oregon, Coordinated Care Organizations (CCOs) are being established to improve care, reduce costs and improve health outcomes. CCOs will be financed under a global budget with a fixed rate of growth. All of these initiatives could affect the estimated utilization and cost of Medicaid services. We did not attempt to include the potential changes to the per-person cost of Medicaid services that could be due to these policy initiatives as it is too early in the implementation process to know the magnitude of the impact. This will be an area of future analysis as potential savings from CCOs become more evident.

We hypothesize that the lifetime Medicaid savings due to an increase in high school graduation will still be apparent regardless of changes to the Medicaid delivery system. However, the magnitude of the return may change due to a potential drop in the baseline cost of per-person Medicaid spending.

Refer to Appendix B for additional details on the methodology used to calculate this ROI.

Crime

We performed our own economic projections on the crime-derived benefits of increasing the graduation rate by 1%, basing our methodology in part on a 2001 National Bureau of Economic Research paper.[79] Our estimate includes the savings from victim costs, property loss and incarceration and, for reasons of data availability, is focused solely on males. Based on Oregon's arrest and offense data for males in eight different categories of crime,[§§] we projected that a 1% increase in Oregon's male high school graduation rate would result in a baseline year economic benefit of $187,924 and a lifetime benefit of $3,814,812. Note that this figure is substantially less than the estimates provided in the literature, in part due to the conservative nature of what we included in our estimates. The table on the following page provides a summary of the projected impact on male crimes and related savings (note that some crime categories would actually increase). See the ROI Methodology section of Appendix B for more details on how these figures were computed.

Economic Capacity

The economic capacity domain of our ROI is divided into two components: first, we looked at the governmental benefit (both state and federal) that would come from increased tax revenue associated with expected higher incomes of new high school graduates; second, we looked at the lifetime impact of the increased income itself (post-tax, to avoid double-counting).

Higher household incomes drive increased economic activity in the form of investment and spending, which can also impact other types of tax revenue such as property tax (more individuals purchasing houses, or purchasing houses with greater value) and capital gains tax (investments), although we did not explicitly consider the impact on these other revenue streams. In 2010, the median annual income difference in Oregon between the graduates and non-graduates was nearly $6,200 per person.

Based on a rudimentary analysis of the impact of this income differential on tax revenues, we estimate that the state would gain an extra $473 per person in revenue per year and the federal government an extra $927 per person per year. Projected over a lifetime, this would result in a benefit of $8,012,997 at the state level or $23,717,117 million when taking both state and federal revenues into consideration.

[§§] Murder, aggravated assault, rape, robbery, burglary, larceny/theft, motor vehicle theft and arson.

For household income, once taxes are removed from the analysis, there is an estimated $4,777 per person annual earnings difference between graduates and non-graduates. This translates into $2,398,054 per year, or an estimated $80,926,190 over the lifetime. See the ROI Methodology section in Appendix B for more detail, including limitations and other important notes.

Making the Investment in School Health Capacity

Improving school health capacity and student health is logical and feasible, but it does take a meaningful, sustained commitment. This is especially true in a context where health-promoting efforts are competing against well-funded marketing influences dedicated to promoting unhealthy choices among youth such as advertising of non-nutritious foods, alcohol and tobacco.

TABLE 2: PROJECTED LIFETIME IMPACT ON ARREST RATES AND CRIME COSTS/ SAVINGS OF INCREASING OREGON 2010 HIGH SCHOOL MALE COMPLETION RATES BY 1%

CRIME CATEGORY	2010 MALE CRIMES	ESTIMATED CHANGE IN MALE CRIMES***	TOTAL LIFETIME PROJECTED BENEFIT/(COST)†††
Murder	74	-1.41	$6,437,433
Rape	1,036	9.0	($1,210,285)
Robbery	1,591	1.25	($17,743)
Assault	4,329	-63.20	$303,964
Burglary	11,738	-20.32	$30,258
Larceny/Theft	36,058	-77.11	$23,054
Motor Vehicle Theft	6,155	-60.04	$112,754
Arson	337	-1.84	$108,605
TOTAL	**61,318**	**-213.67**	**$5,788,041**

***Adjusted by multiplying change in arrests by ratio of Oregon crimes: arrest for each crime category.

†††This is the raw estimate before annual inflation and discount rates have been applied.

‡‡‡Full-time nurse means 5 days per week, during all school hours. Source: 2010 Oregon Profiles Survey of secondary school principals.

Schools are largely underfunded to meet their basic educational mission. The vast majority of schools are not supported to create or sustain basic school health capacity or services. A striking example in Oregon is the state of school nursing. Fewer than one in 10 (8%) Oregon secondary schools have a full-time registered nurse (RN) on campus.‡‡‡

Despite that lack of resources, there are a considerable number of unfunded school health mandates in Oregon.

Examples of school health-related policies or activities that are required by state law include:§§§

- District improvement plans for safe school environments;
- District Wellness Policies;
- Health education on topics including alcohol/drugs, human sexuality, HIV/STDs;
- Tobacco-free school policies and signs;
- Physical education minimum requirements for grades K-8, and 1 credit in high school;
- Physical/mental health services;
- Family/community involvement;
- Minimum nutrition standards for foods not included in the federal meal programs;
- Policies prohibiting harassment, bullying and intimidation;
- Emergency plans and procedures;
- Immunization requirements;
- Diabetes reporting;
- Health services, including asthma medication self-carrying policies, guidelines for administration of other medications, and minimum student-to-nurse ratio (especially for “medically complex” students);
- Integrated pest management plan; and
- Oregon Diploma requirement for one credit each of Health education and physical education.[80]

§§§ Healthy Kids Learn Better: Summary of Selected School Policies Grouped by Coordinated School Health Components. Retrieved from http://public.health.oregon.gov/HealthyPeopleFamilies/Youth/HealthSchool/HKLB/Documents/CSH_SchoolLaw.pdf

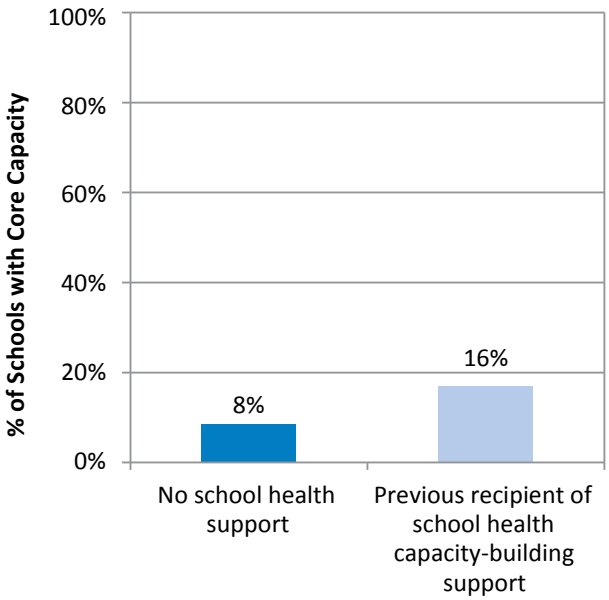
Importance of Past School Health Capacity-Building Efforts

Oregon currently does not provide consistent state funding to schools or districts to support comprehensive school health efforts. We linked information from schools that participated in the School Health Profiles Survey to records describing previous participation in school health efforts. Approximately one in 10 respondents overall had received one or more of these school health supports (see Figure 18 source note for a list of the supports considered). In addition, schools may have participated in other school health efforts not included in this analysis.

Schools that had previously participated in school health programs were twice as likely to currently have Core Capacity, in comparison to schools where no record of participation in previous school health efforts was indicated (see Figure 18).

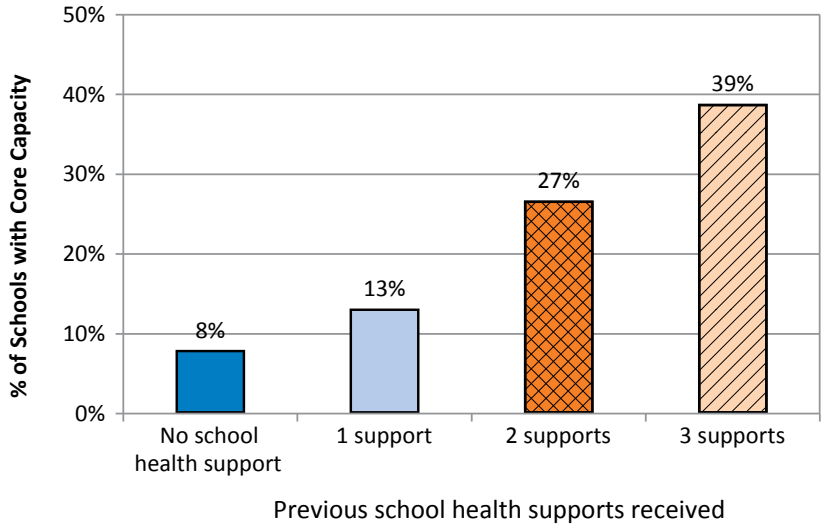
In addition, the more school health capacity-building programs a school had previously participated in, the more likely a school was to currently have Core Capacity (Figure 19). This association can work in both directions: schools with Core Capacity may be in a better position to learn about and successfully apply for participation in programs that provide more support for school health efforts.

FIGURE 18: PERCENTAGE OF OREGON SCHOOLS WITH CORE CAPACITY FOR SCHOOL HEALTH, BY PREVIOUS PARTICIPATION IN SCHOOL HEALTH INTERVENTIONS



Source: Oregon School Health Profiles Survey, 2010, and Coordinated School Health Program (building-level participation in any of multiple school health interventions: School Garden and Farm-to-School local food purchasing programs; Fresh Fruit and Vegetables program through ODE nutrition services; Safe Routes to School, infrastructure and non-infrastructure; School-Based Health Centers; Alliance for a Healthier Generation; Healthy Kids Learn Better).

FIGURE 19: PERCENTAGE OF OREGON SCHOOLS WITH CORE CAPACITY FOR SCHOOL HEALTH, BY NUMBER OF PREVIOUS SCHOOL HEALTH SUPPORTS RECEIVED



Source: Oregon School Health Profiles Survey, 2010, and Coordinated School Health Program (building-level participation in any of multiple school health capacity-building interventions: School Garden and Farm-to-School local food purchasing programs; Fruit and Vegetables Program through ODE nutrition services; Safe Routes to School, infrastructure and non-infrastructure grants; School-Based Health Centers; Alliance for a Healthier Generation; Healthy Kids Learn Better). No more than three of the listed supports were found in the schools in this sample.

LIMITATIONS AND SUGGESTIONS FOR FUTURE STUDY

> *"Not everything that can be counted counts, and not everything that counts can be counted."*
>
> — Albert Einstein (attributed)

In this paper we comprehensively explored correlations between school-level Core Capacity and outcomes from a variety of data sources including: school-level health-related policies and procedures (from the School Health Profiles Survey); student-level health factors and achievement (from the Oregon Healthy Teens Survey); district-level disciplinary data (from the Oregon Department of Education); and school-level graduation rates (also from the Oregon Department of Education). We consistently found associations that suggest Core Capacity provides benefits in school and student factors. These findings would be strengthened by the availability of longitudinal data. The ability to monitor schools that build Core Capacity over time and determine if this capacity development influenced indicators of student health and achievement would greatly strengthen the knowledge base about the impact of Core Capacity.

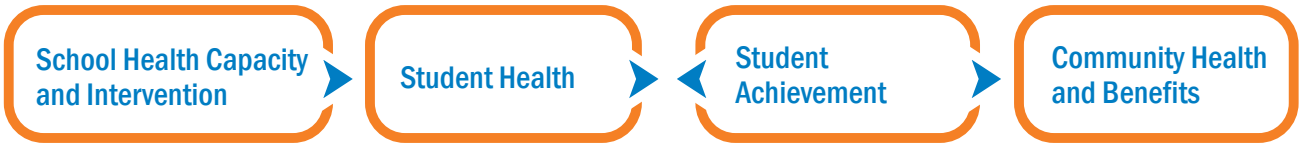
Additionally, socioeconomic status is independently associated with both student health and achievement, and likely accounts for some of the correlation between health and achievement. We controlled for effects of socioeconomic status (SES) on youth and schools to the extent possible. We used school-level free and reduced lunch enrollment as a proxy for SES and incorporated this into our statistical models. However, this method limited the power of our analysis because we were obliged to apply a school-level proxy for SES to student-level outcomes. We explored the association between Core Capacity and graduation rates among economically disadvantaged students alone, and found that associations were still present but were smaller than for students overall. Other studies that have been able to better control for SES effects still found correlations between health and achievement. For example, in a study examining the association between levels of healthy factors and academic achievement, SES was controlled for using youth reports of parental levels of education. Authors found levels of association quite similar to those reported here.[81] A study published in the *Journal of School Nursing* examined correlations between schools implementing coordinated school health programs and student achievement and graduation in all 50 states. The authors were able to adjust for poverty indicators and still found significant associations between school health efforts and improved academic

scores and graduation rates.[82] While the methods we used may not have accounted for all effects of SES, our findings are consistent with previous studies that utilized multiple datasets. Again, longitudinal evaluation of school health improvement efforts in a variety of settings — including low income communities — would help to understand the interaction between SES, health and achievement.

The School Health Profiles Survey is representative of only secondary schools and responses from alternative schools may be lower than traditional schools. Therefore, the results of this report may best be generalized to non-alternative secondary schools, and further investigation of benefits of Core Capacity in primary and alternative settings is recommended.

Finally, in this report we have focused on quantifying the value of school health capacity based on the impact of improved graduation rates. For some populations who have multiple barriers to graduation, improving school health capacity alone may not be enough to help them attain graduation. However, improving the health and well-being of young people is a worthy effort that is likely to improve quality of life and community well-being even if some

CONCLUSION: INVESTMENT IN CORE CAPACITY TO SUPPORT SCHOOL HEALTH PROVIDES LONG-TERM RETURNS



students do not graduate.

In this report we explored the logical, progressive links between school health capacity (Core Capacity), student health, achievement and community-level benefits. Using Oregon data, we confirmed associations seen in other studies that found students with greater numbers of healthy factors more likely to report getting good grades in schools.

We found that the presence of four components of Core Capacity (having a school health coordinator, conducting health-focused self-assessment, having a school health advisory group, and health-related school improvement plan goals and objectives) was generally associated with healthier school policies and practices, healthier student factors, fewer attendance and disciplinary problems, and improved graduation rates. We estimated the potential return for statewide investment in the development in Core Capacity (represented by the salary of a half-time school health coordinator in every secondary school), and found that the economic value of improving graduation rates by even just 1% far outweighs the estimated costs for building Core Capacity.

APPENDIX

Addressing health is one key factor in addressing the achievement gap and improving equity. The need for — and potential benefits from — Core Capacity may be even more important for under-resourced students. Oregon data indicate that Core Capacity can be built in a variety of school settings: large and small, urban and rural. Local schools and community stakeholders can engage in meaningful partnerships in order to identify health-related barriers to learning and to implement culturally competent, evidence-based interventions to meet the needs of their unique populations.

viable strategy to meet the dual goals of better health and better achievement. Supporting
Addressing health-related barriers to learning supports the achievement of children and youth.
health and wellness in the school setting is a critical strategy in building healthier, vibrant
This analysis indicates that developing and sustaining Core Capacity in Oregon schools is a
communities.

APPENDIX A: DATA SOURCES

Summary of Measures and Their Availability

We used measures from multiple datasets to describe different factors in this report. These datasets are summarized in the table below, and additional details about each dataset are provided in the following section.

STUDENT-LEVEL DATA	SCHOOL BUILDING-LEVEL DATA	DISTRICT-LEVEL DATA
Oregon Healthy Teens Survey (OHT) ■ Student behaviors ■ Academic achievement (self-reported grades in school)	CDC School Health Profiles Survey (Profiles) ■ Health-related school policies and practices ■ Core Capacity for school health School building demographics ■ Free and reduced lunch % enrollment ■ School enrollment ■ Urban/rural location Graduation rates	School district demographics (for district-level model on discipline incidents) ■ Free and reduced lunch % enrollment ■ District enrollment Discipline incidents data (including truancy)

Oregon Healthy Teens Survey (OHT)

The Oregon Healthy Teens Survey is implemented in public schools in Oregon to monitor the health and well-being of adolescents in eighth and 11th grades. The survey is anonymous and confidential. Schools are given the option of administering the survey electronically or with a paper questionnaire. Students complete the paper-based survey in the classroom and web-based version in the computer lab. Schools are randomly selected to participate and have the option to refuse participation without penalty. In 2009, the OHT survey was completed by 5,348 eighth-graders and 3,551 11th-graders. For each survey year, a state weight is generated for both eighth- and 11th-graders to reflect the probability of a student being selected from his/her school (based on grade-specific enrollment). Additionally, the strata

and primary sampling unit often differ from year to year, depending on the sampling method (i.e., whether the sample was stratified by region or simply by school size). For the analyses that use only 2009 data (Figures 2, 3 and 4), the 2009 survey design settings and weights were used to complete the analyses. For analyses that combined multiple years of data from 2006–2009, each year's weights were used, but the data were stratified by year.

Note: Questions about what kind of grades students usually got in school were not included on the eighth-grade survey version in 2007. This question was available in 2006, 2008 and 2009 for eighth-graders and on all four years for 11th-graders.

More information about the OHT survey is available at: https://public.health.oregon.gov/BirthDeathCertificates/Surveys/OregonHealthyTeens/Pages/index.aspx.

School Health Profiles Survey

The School Health Profiles Survey (Profiles) is a biennial survey conducted by the Centers for Disease Control and Prevention and administered by the Oregon Public Health Division in partnership with the Oregon Department of Education. The Profiles Survey is composed of two questionnaires for each school in the sample, one for the principal and one for the lead health educator. The sample is drawn from public middle and high schools (schools with grades between and including sixth and 12th), including alternative schools but excluding treatment and incarceration facilities. Random samples of schools, stratified by school district size, are invited to participate at each administration of the surveys. Schools may refuse to participate without penalty. Surveys are sent to approximately 400 of the 630 eligible schools each administration. Email, mail, and phone reminders are conducted until at least 70% of principals and lead health education teachers invited to participate have completed surveys. The target of 70% participation has been achieved at each administration since 2004 (i.e., 2004, 2006, 2008 and 2010).

The principal survey monitors the status of school health policies related to tobacco-use prevention, nutrition, and HIV infection/AIDS; physical education requirements; asthma management activities; school health coordination/capacity; and, family and community involvement in school health programs. The lead health education teacher survey assesses schools' health education requirements and content taught with particular focus on tobacco-use prevention, pregnancy prevention, nutrition, and physical activity. The professional preparation of health education teachers and ongoing professional development are also assessed in the lead health education teacher survey.

Additional information about the School Health Profiles Survey is available at: www.cdc.gov/healthyyouth/profiles/.

Graduation Rates

Data files for four-year cohort graduation rates for 2009–10 were obtained from the Oregon Department of Education. There are multiple ways to calculate graduation rates. The method

used in Oregon is based on the number of on-time high school graduates (receiving a diploma), divided by the number of students who enter Oregon public schools in ninth grade four years previously, adjusted for students who transfer into the Oregon public school system, transfer out or to home school, left the state, or were deceased.

Additional information is included at www.ode.state.or.us/search/page/?id=2644.

Oregon School Building and District Demographic File

Oregon Department of Education data on total population size of schools and student demographic characteristics, such as percent free and reduced lunch enrollment, were available at both the building and district level at www.ode.state.or.us/data/reports/toc.aspx#students.

Urban/rural location of school buildings was assigned based on zip code of the school (at the school building level) using federally defined Rural-Urban Commuting Area Codes. Information about RUCA classifications is available at http://depts.washington.edu/uwruca/.

Discipline Incidents Data

Oregon public schools are required by federal and state law to report discipline incidents on an annual basis for July–June. These include suspensions, expulsions, truancies, and removals to alternative settings.

Additional information about this system is available at www.ode.state.or.us/search/results/?id=107.

APPENDIX B: SPECIFIC ANALYTIC METHODS SUMMARY

All analyses were conducted using the Stata 10.1 statistical analysis package. Brief descriptions of analyses are included below each figure in the report, and more detailed summaries are provided with tables in the report appendix.

Merged/Multilevel Datasets

Our approach for merging datasets was to preserve the smallest units of data possible for the outcome of interest. This means that when presenting student-level data associated with school-level factors (such as health-related school building policies, practices, and Core Capacity), we merged school information onto student-level information. In this report we generally provide crude associations however we also used adjusted models that accounted for socioeconomic status (SES, using the percent of free and reduced lunch program enrollment in school buildings as a proxy for SES), school size and school type, as appropriate.

School-level datasets were matched by school building identifier (these datasets include Profiles data, high school graduation rates, and school-level demographics).

Discipline data were only available on a district level. Therefore, in keeping with our smallest-unit of analysis approach, we merged discipline data onto school-building information about school health capacity. We performed this analysis only on high schools in the 2010 School Health Profile sample.

Additionally we explored multilevel models when sample size was sufficient, to control for the correlation in behaviors among students in the same buildings or among buildings in the same district. We used a regression model that allowed both fixed and random effects to test associations between presence of school health capacity, specific policies or practices, and school-level prevalence of students' behaviors, linked by school building. We used the same model to test associations between school district measures (discipline incidents data) and school-level factors (school health capacity).

The following tables show the sample sizes that were available for different merged datasets.

Observations with both student (2009 Oregon Healthy Teens Survey) and school-level information (2010 School Health Profiles), linked at student level (59 total schools)

	8TH GRADE/MIDDLE SCHOOL	11TH GRADE/HIGH SCHOOL
Schools with core capacity	653 students, 6 schools	876 students, 8 schools
Schools WITHOUT core capacity	3,273 students, 27 schools	1,760 students, 18 schools

Observations with district-level information and school-level information (2010 School Health Profiles) (232 total schools)

	MIDDLE SCHOOL	HIGH SCHOOL
Schools with core capacity	13	14
Schools WITHOUT core capacity	113	90

ROI Calculation Methodology

This section is designed to make explicit the assumptions we used in formulating our Return on Investment (ROI) calculations. We also make note of the limitations inherent in the choices that we made. While we attempted to be as thorough as possible, many of the assumptions we use are based on extrapolation from other published literature. For example, in the crime section, our results are based on modeling conducted from 1990 (and earlier) national crime data. This certainly introduces more uncertainty into our findings, as it is unclear if the same relationships estimated in 1990 hold true today, and whether those relationships are consistent at the federal and Oregon levels. Nevertheless, we feel this provides a reasonable look at some of the potential benefits we might see from an increase in school health Core Capacity and a 1% increase in high school graduation.

We provide two measures of ROI — one based on benefits that would mainly accrue within Oregon (either to the state itself or to the state economy) — and another that also incorporates federal benefits. In part, this is because the costs for implementing Core Capacity could be borne at the state and/or federal levels.

The only area where we were not able to divide state and federal benefit is in the savings from reductions in crime. This is mainly due to the difficulty in separating federal, state and societal costs, a limitation we explain in the crime section.

All dollar values are presented in 2010 dollars, and our consideration of "lifetime" benefit is limited to ages 19–64 due to changes in public program eligibility and typical changes in personal earnings.

TABLE A: SUMMARY OF OREGON RETURN ON INVESTMENT MEASURE

LIFETIME COST/BENEFIT	2010 DOLLARS
Taxpayer Cost of Implementing School Health Core Capacity	($18,861,795)
Benefit from Reduced Medicaid Enrollment	$6,131,177
Benefit from Increased Tax Revenue	$8,012,997
Benefit from Increased Individual Earnings (Post-tax)	$80,926,190
Benefit from Reductions in Crime	$3,814,812
TOTAL Lifetime Benefit	$98,885,176
Projected Oregon Return on Investment from Implementing School Health Core Capacity	**$5.24:$1**

TABLE B: SUMMARY OF TOTAL (OREGON + NATIONAL) RETURN ON INVESTMENT MEASURE

LIFETIME COST/BENEFIT	2010 DOLLARS
Taxpayer Cost of Implementing School Health Core Capacity	($18,861,795)
Benefit from Reduced Medicaid Enrollment (State + Federal Cost)	$16,379,982
Benefit from Reductions in Crime	$3,814,812
Benefit from Increased State + Federal Tax Revenue	$23,717,117
Benefit from Increased Individual Earnings (Post-tax)	$80,926,190
TOTAL Lifetime Benefit	$124,838,100
Projected TOTAL (Oregon + National) Return on Investment from Implementing School Health Core Capacity	**$6.62:$1**

TABLE C: GENERAL ASSUMPTIONS USED ACROSS DOMAINS

DESCRIPTION OF ASSUMPTIONS	DATA POINT USED	SOURCE
Size of 2010 Oregon high school 4-year cohort	50,170	Oregon Dept. of Education, average of 2008–2010 4-year cohorts www.ode.state.or.us/search/page/?id=2644
Total # of high school graduates, 2010 (baseline)	33,254	Oregon Dept. of Education, average of 2008–2010 4-year cohorts www.ode.state.or.us/search/page/?id=2644
Total # of high school graduates, assuming a 1% increase	33,756	Based on a 1% calculation of total cohort size
Discount rate/per year****	3.5%	Surveyed social sciences literature for guidance on how to set discount rate. Rate selected similar to what was used in Levin, Belfield, Muennig & Rouse (2006), The Costs and Benefits of an Excellent Education for All of America's Children
Medical inflation rate/ per year	4.0%	Estimate based on historical averages produced by the Bureau of Labor Statistics http://ycharts.com/indicators/us_health_care_inflation_rate
General inflation rate/ per year	2.0%	Estimate based on historical inflation data and Congressional Budget Office predictions www.cbo.gov/publication/42905

****Discounting is applied to future costs in order to make them comparable to current costs, and to calculate a Net Present Value of costs accruing over time. This is necessary because dollars in the future are worth less than the same dollar amount in the present. For more on discounting, please see www.epa.gov/opptintr/coi/pubs/appa.pdf.

Cost Estimate

We approximated the cost of implementing school health Core Capacity by calculating the cost of hiring and maintaining a 0.5 FTE masters-level staff at each secondary school in Oregon (middle and high schools).

TABLE D: COST-SPECIFIC ASSUMPTIONS

DESCRIPTION OF ASSUMPTIONS	DATA POINT USED	SOURCE
Full-time salary of Oregon masters-level teacher (midpoint of salary scale)	$45,070	Oregon School Board Association www.osba.org/~/media/Files/Resources/Employee%20Management/2011-12_Salary_Survey_book_rev.pdf
Fringe benefit rate	35%	Calculated from District Expenditure Reports www.ode.state.or.us/sfda/reports/r0091Select2.asp
Number of public secondary schools in Oregon	620	Based on ODE School Enrollment Reports, including all middle and high schools, charter schools, and alternative schools (excluding treatment facilities, homeschooling programs, and institutional schools)

Notes and Limitations of Cost Estimate Methodology

1. Estimating Core Capacity using the salary of one half-time teacher per school probably inflates the costs since student enrollment at Oregon's secondary schools is quite variable. We could have chosen a lower figure by calculating the number of teachers needed to achieve a specific ratio across the state (i.e., 1:500 students). But we chose to estimate one staff per school for the sake of conceptual simplicity and also to keep our ROI estimates conservative.
2. This ROI factors in the cost of one year of a half-time staff salary/benefits per school. In the initial years of implementing school health Core Capacity, it would undoubtedly take more than one year of investment to reap the rewards. However, once a program was up and running, each year of new graduates would benefit from a year of increased capacity. We considered different approaches to costing this element, but considering that we are inserting a half-time FTE as a proxy for boosting school health capacity, it became extremely difficult to determine more reasonable assumptions for a number of years of staff costs for one year of high school graduation costs.

Medicaid Savings Benefit Estimate Methodology

TABLE E: MEDICAID-SPECIFIC ASSUMPTIONS

DESCRIPTION OF ASSUMPTIONS	DATA POINT USED	SOURCE
Average TOTAL annual cost of an adult Medicaid enrollee in Oregon (ages 19–64)	$4,555	Kaiser State Health Facts www.statehealthfacts.org/profileind.jsp?cat=4&sub=47&rgn=39
Average STATE annual cost of adult Medicaid enrollee in Oregon	$1,710 (based on 62.45% federal match rate)	HHS Assistant Secretary for Planning and Evaluation http://aspe.hhs.gov/health/fmap09.htm
% of Oregon HS graduates on Medicaid (point in time estimate)	7.7%	OHPR's Oregon Health Insurance Survey (OHIS), 2011 (unpublished)
% of Oregon non-HS graduates on Medicaid	21.6%	OHPR's Oregon Health Insurance Survey, 2011 (unpublished)
# 2010 cohort expected to be on Medicaid (no change in graduation rates)	6,214	Ratio of grad/non-grads times the % on Medicaid from OHIS survey
# 2010 cohort expected to be on Medicaid (1% change in graduation rates)	6,144	Ratio of grad/non-grads x the % on Medicaid from OHIS survey
# of cohort expected to avoid Medicaid enrollment based on 1% increase in graduation rate	70	# expected enrollees (status quo) - # expected enrollees (1% bump)
Year 1 Oregon savings from Medicaid enrollment	$119,345	# avoiding Medicaid x Avg State Per Enrollee Spending
Year 1 Total savings from Medicaid enrollment	$318,841	# avoiding Medicaid x Avg Total Per Enrollee Spending

Lifetime Medicaid savings at both the state and federal levels were calculated in a multi-step process. All figures were adjusted upwards using a medical inflation rate of 4.0%.

1. Get the expected Year 1 value of Medicaid spending assuming NO new graduates (status quo): Multiply the average annual cost of (Oregon or Total) per enrollee Medicaid spending (adults 19–64) by the number of actual high school graduates (an average of the 2008–2010 cohorts) times the % of graduates expected to be on Medicaid. Do the same thing for non-HS graduates using the % of non-graduates expected to be on Medicaid. Add the two together.
2. Get the expected Year 1 value of Medicaid spending assuming a 1% bump in graduation rates: Do the same thing as step 1 but using adjusted figures for high school graduates/non-graduates if a 1% bump in graduation rates occurred (producing an additional 502 graduates).
3. Subtract New spending from Status Quo spending. This is the Year 1 savings.
4. Project the Year 1 savings over 46 years using a 4.0% medical inflation rate.
5. Sum years 1 through 46 to produce a lifetime Net Present Value using a 3.5% discount rate.

CRIME CATEGORY	PROJECTED ANNUAL RATE OF DECLINE
Murder	0.78%
Forcible Rape	1.74%
Robbery	3.86%
Aggravated Assault	3.24%
Burglary	3.66%
Larceny	2.02%
Motor Vehicle Theft	2.34%
Arson	2.51%

Notes and Limitations of Medicaid Savings Methodology

Medicaid

1. The Affordable Care Act requires states to expand Medicaid enrollment for adults and provides additional federal funding to do so. In particular, as Medicaid is opened up to individuals at higher income levels, it is plausible that the average per-person spending will go down (higher income = less infirm population). Average spending could also decline because pregnant women will make up a smaller proportion of the Medicaid population (eligibility for pregnant women is already higher than working-age adults). We were not able to project the impact that these factors may have on state and federal Medicaid costs moving forward.
2. Oregon is currently transforming the delivery of Medicaid services in the state. Coordinated Care Organizations (CCOs) are being established to improve care, reduce costs and improve health outcomes. CCOs will be financed under a global budget with a fixed rate of growth. We did not attempt to include the potential changes to the per-person cost of Medicaid services that could be due to CCOs as it is too early in the implementation process to know the magnitude of the impact. This will be an area of future analysis as potential savings from CCOs becomes more evident. We hypothesize that the lifetime Medicaid savings due to an increase in high school graduation will still be apparent regardless of changes to the Medicaid delivery system. However, the magnitude of the return may change due to a potential drop in the baseline cost of per-person Medicaid spending.

3. We used estimates from the Oregon Office of Health Policy and Research's 2011 Oregon Health Insurance Survey to determine the percentage of people who had Medicaid for health insurance by level of educational attainment. These figures are point-in-time estimates and are not necessarily consistent across a whole year. However, our assumption is that the patterns of fluctuation on and off Medicaid will generally be consistent within educational attainment groups, so the differences should not impact long-term calculations considerably.
4. We used the average cost of an adult (ages 19–64) on Medicaid in Oregon to calculate our benefit. There are wide variations in Medicaid costs associated with demographic factors and health status that are not accounted for here. For example, it is possible that Medicaid costs systematically differ by the level of educational attainment, which would influence our "true" savings here.

Crime Savings Methodology

TABLE F: ASSUMED ANNUAL RATE OF REDUCTIONS IN CRIME

Source: Based on the average change in Oregon crime rates between 1990–2010 from www.ucrdatatool.gov/Search/Crime/State/RunCrimeStatebyState.cfm.

TABLE G: PROJECTED IMPACT ON ARREST RATES AND CRIME COSTS/SAVINGS OF INCREASING U.S. HIGH SCHOOL MALE COMPLETION RATES BY 1%†††

CRIME CATEGORY	U.S. TOTAL COST PER CRIME‡‡‡‡	ESTIMATED CHANGE IN ARREST RATE	U.S. TOTAL ESTIMATED BENEFIT
Murder	$4,561,627	-2.13%	$1,701,487,039
Rape§§§§	$134,572	1.05%	-$209,797,193
Robbery	$14,155	.11%	-$12,994,615
Assault	$14,958	-2.18%	$555,467,906
Burglary	$1,489	-0.25%	$14,093,407
Larceny/Theft	$299	-0.28%	$10,483,846
Motor Vehicle Theft	$1,878	-0.35%	$26,736,516
Arson	$58,887	-0.41%	$27,617,946

†††Adapted from Tables 11 and 14 of Lochner & Moretti (2001) paper, all dollars converted to 2010 dollars.

‡‡‡‡Total cost = victim cost + incarceration cost – (80% of property loss)

§§§§Lochner & Moretti's models predicted an increase in robberies and rapes associated with a decreasing high school dropout rate for unknown reasons. One theory is that individuals with lower levels of education may have a more restrictive definition for what constitutes rape.

TABLE H: 2010 OREGON CRIME DATA: OFFENSES AND ARRESTS, TOTAL AND ADULT MALE

CRIME CATEGORY	OREGON TOTAL OFFENSES	OREGON TOTAL ARRESTS	ESTIMATED OREGON MALE ADULT OFFENSES (AGE 19–64 YRS)*****	OREGON MALE ADULT ARRESTS (AGE 19–64 YRS)
Murder	117	90	74	57
Rape	1,246	243	1,036	202
Robbery	2,425	1,018	1,591	668
Aggravated Assault	6,091	3,325	4,329	2,363
Burglary	19,818	2,693	11,738	1,595
Larceny/Theft	87,948	22,220	36,058	9,110
Motor Vehicle Theft	9,831	1,848	6,155	1,157
Arson	1,039	287	337	93

*****Offenses not published by gender/age. Estimates created using the following formula:

$$\#\ Offenses_{Male} = \#\ Arrests_{Male} \times (\#\ Offenses_{Total} / \#\ Arrests_{Total})$$

TABLE I: PROJECTED LIFETIME IMPACT ON ARREST RATES AND CRIME COSTS/SAVINGS OF INCREASING OREGON 2010 HIGH SCHOOL MALE COMPLETION RATES BY 1%

CRIME CATEGORY	ESTIMATED CHANGE IN ARRESTS	ESTIMATED CHANGE IN CRIMES††††	COST PER CRIME	TOTAL LIFETIME PROJECTED BENEFIT/(COST)
Murder	-1.22	-1.41	$4,561,627	$6,437,433
Rape	2.12	9.0	$134,572	($1,210,285)
Robbery	0.75	1.25	$14,155	($17,743)
Assault	-51.49	-63.20	$14,958	$303,964
Burglary	-3.99	-20.32	$1,489	$30,258
Larceny/Theft	-25.23	-77.11	$299	$23,054
Motor Vehicle Theft	-14.71	-60.04	$1,878	$112,754
Arson	-0.73	-1.84	$58,887	$108,605
TOTAL	**-94.49**	**-213.67**	**--**	**$5,788,041**

††††† Adjusted by multiplying change in arrests by ratio of Oregon crmes:arrest for each crime category.

‡‡‡‡‡ This is the raw estimate before annual inflation and discount rates have been applied.

Initial calculations were based on estimates from a 2001 paper by Lance Lochner and Enrico Moretti entitled "The Effect of Education on Crime: Evidence from Prison Inmates, Arrests and Self-Reports."[83] We used their estimates of the impact on crime-related costs/benefits of raising the high school graduation rate for males by 1%. However, their estimates assumed a 1% increased graduation rate for ALL cohorts of males with a single point-in-time impact, while we were interested in the lifetime impact on a *single* cohort (2010). As is described below, we applied their estimates to 2010 crimes committed over a lifetime where year 1 = crimes committed by 19-year-old males and year 46 = crimes committed by 64-year-old males. This served as the basis for our work shown here. As with the other domains, all starting dollars were converted to 2010 dollars. Our methodology was as follows:

1. Analyze average annual change in Oregon crime rates between 1990 and 2010 to produce crime-specific reduction rates to use for future year analyses (Table F).
2. Convert benefit estimates from Lochner & Moretti paper from 1993 to 2010 dollars (Table G).
3. Obtain 2010 Oregon offense and arrest data from www.oregon.gov/osp/CJIS/docs/

§§§§§ The complete calculations and data for this section were too complex to reprint in full but are available upon request.

2010 section_6_statewide_arrest_information_2010.pdf. We recorded the number of offenses and arrests for each crime category at each age between 19 and 64 (where year 1 = age 19 and year 46 = age 64). Some ages were grouped into 5-year ranges; for these, we divided the number of crimes by 5 to estimate crimes at that particular year. Data was available for total and male arrests as well as total offenses. Male offenses were calculated by multiplying total offenses by (male arrests/total arrests) for each year/crime category combination (summarized in Table H).[84,§§§§§]

4. For each year of the lifetime (19–64), multiply male arrests recorded in step 3 by the projected change in arrest rates shown in Table G.
5. Adjust change in *arrests* to change in *crimes* (offenses) for adult males by multiplying male arrests by ratio of total arrests: total offenses in each category (Table H).
6. Apply estimated annual rates of crime-specific decline from Table F to change in male offenses from step 5 to incorporate the natural reduction in crime rates that we expect to see over time.
7. Multiply projected male offense changes for each year in step 6 by benefit estimates in Table G; sum across all crime categories for each year to obtain estimated annual savings in Years 1–46 (Table H).
8. Apply 2% inflation rate to each year of savings (Years 1–46).
9. Apply a 3.5% discount rate to each year of savings; Sum discounted years 1 through 46 to produce a lifetime Net Present Value.

Notes and Limitations of Crime Savings Methodology

1. In order to accurately estimate the lifetime impact of crime reduction on a single cohort of 18-year-old males in 2010, we extracted detailed crime data by age from Oregon's crime statistics for 2010. Some of these numbers were small, and undoubtedly somewhat unstable from year to year (i.e., had we used 2009 instead of 2010 statistics, our projections may have looked somewhat different). For future analyses, we could average crime numbers across several years to get a more stable estimate of annual crimes committed by Oregon males at each year of life.
2. This analysis does not account for the potential impact of changes in other crime categories such as drug crimes, simple assault, and sex crimes (aside from rape).
3. This analysis is based on crimes (offenses) *reported* rather than actual crimes committed. Many of these crimes have high estimated rates of non-reporting. According to the 2010 National Crime Victimization Survey, the percentage of victims who said they reported their incidents to the police was: rape/sexual assault (49%); robbery (58%); aggravated assault (60%); and larceny (63%).[85] Some savings would only be incurred based on arrests (incarceration) while others would be incurred regardless of arrest or reporting status (property loss, victim costs).
4. We based our calculations for reductions in crime on the comprehensive paper by Lochner & Moretti. However, this paper is based on crime data from 1960–1990 and it is certainly possible that the relationship between educational attainment and crime has shifted. However, there is no intuitive reason to think that the economic incentives that define the risks/rewards between high school graduation and criminal activity have changed substantially.
5. The savings derived from this calculation were used in both the Oregon and Total ROI measures. However, the benefits for this category do accrue to a wide range of entities. The estimates we applied were based on savings from reductions in incarceration, property loss and victim costs (which include physical and mental health care costs, productivity, police/fire services, and social services)[86] that were inextricably linked. Therefore, some "global" savings (such as federal incarceration costs) are included in the Oregon ROI. However, given the limited contribution that this category makes towards the total benefit (approximately 3%), this limitation has a narrow impact.
    a. In 2011, the average cost of incarceration in Oregon was $82.48/day, or $30,105 per year.[87] We did not include this finding in our estimate because average sentences for crime were only available for murder. Without other average estimates for the crimes considered here, we could not use incarceration costs consistently. In addition parole and probationary costs vary by crime and are not included here.
6. This analysis only calculates the benefit accruing from a 1% increase in *male* graduation rates. While males do make up the bulk of crimes in several of the categories used, females do also commit crimes (particularly larceny/theft and robbery). We did not have

estimates for the impact on female crime rates, but we can assume that an analysis of both genders would result in an even more marked cost savings.

Tax Revenue Methodology

TABLE J: TAX REVENUE ASSUMPTIONS

DESCRIPTION OF ASSUMPTIONS	DATA POINT USED	SOURCE
Median annual income of Oregon adult (25+) with less than a high school degree (2010)	$17,970	2010 American Community Survey, Table S1501 (1-year estimates) Oregon http://factfinder2.census.gov/bkmk/table/1.0/en/ACS/10_1YR/S1501/0400000US41
Median annual income of Oregon adult (25+) with a high school degree (2010)	$24,147	
Estimated 2010 Oregon state tax from individual with less than a high school degree	$1,008	Generated by TAXSIM calculator from National Bureau of Economic Research; assumed median income from ACS survey, no other income or dependents http://users.nber.org/~taxsim/taxsim-calc9/
Estimated 2010 Oregon state tax from individual with a high school degree	$1,481	
Estimated 2010 Federal tax from individual with less than a high school degree	$874	
Estimated 2010 Federal tax from individual with a high school degree	$1,801	
Total New Oregon tax revenue expected (Year 1)	$237,446	($1,481 - $1,008) x 502 new graduates
Total New Federal tax revenue expected (Year 1)	$465,354	($1,801 - $874) x 502 new graduates
Total tax revenue expected (Year 1)	$702,800	Sum state + federal revenue

In this part of the benefit analysis, we estimated the additional state and federal tax revenues that would accrue if the high school graduation rate increased by 1%. For the purposes of estimating future income, we assumed that the additional graduates did not go on to higher education (i.e., associates, bachelors, graduate degrees). The methodology was as follows:

1. Obtain median income estimates by level of educational attainment from the 2010 American Community Survey for Oregon adults.
2. Estimate 2010 tax revenue for both state of Oregon and federal government for an individual with the median income for his/her level of educational attainment using the TAXSIM calculator.
3. Multiply the difference in estimated tax revenue by the number of projected new graduates (502) to get Year 1 New Revenue figure of $237,446 for state revenue and $463,354 for federal revenue.
4. Project the Year 1 savings over 46 years using a 2% inflation rate.
5. Sum years 1 through 46 to produce a lifetime Net Present Value using a 3.5% discount rate.

Notes and Limitations of Income Tax Revenue Methodology

1. Assuming that high school graduates did not go on to additional years of school makes our income disparity estimates quite conservative.
2. This is a very rough estimate that incorporates no other assumptions that would influence tax rates, such as number of dependents, presence of investment/other income, receiving Social Security benefits, etc. These assumptions could either add to or subtract from the projected benefit.
3. We also did not make any assumptions about residual effects on educational attainment (and therefore income/tax revenue) among peers already graduating from high school whose educational attainment level may increase given the increase in average attainment among their peers. There is some evidence to suggest that peer achievement and expectations do play a role in influencing educational attainment, particularly among low-achieving peers.[88]

Individual Earnings Methodology

TABLE K: INDIVIDUAL EARNINGS ASSUMPTIONS

DESCRIPTION OF ASSUMPTIONS	DATA POINT USED	SOURCE
Median pre-tax annual income of Oregon adult (25+) with less than a high school degree (2010)	$17,970	2010 American Community Survey, Table S1501 (1-year estimates) Oregon
Median pre-tax annual income of Oregon adult (25+) with a high school degree (2010)	$24,147	

Estimated post-tax annual income of Oregon adult with less than a high school degree (2010)	$16,088	$17,970 - $1,008 (state tax) - $874 (federal tax)
Estimated post-tax annual income of Oregon adult with a high school degree (2010)	$20,865	$24,147 - $1,481 (state tax) - $1,801 (federal tax)
Total New Individual Income (Year 1)	$2,398,054	($20,865-$16,088) x 502 new graduates

This part of the ROI measure examines the lifetime impact of individuals having a higher income from having graduated high school. As with the tax revenue estimate, when estimating individual income we do not assume that any of the 502 new graduates go on to any education beyond high school. In order to avoid double-counting, we calculated only the post-tax earnings. The steps are very similar to the tax revenue steps:

1. Obtain median income estimates by level of educational attainment from the 2010 American Community Survey for Oregon adults.
2. Subtract out the estimated state and federal tax from the median incomes to get an estimate of post-tax income.
3. Multiply the difference in median income ($4,777) by the # of projected new graduates (502) to get Year 1 New Individual Earnings figure of $$2,398,054.
4. Project the Year 1 savings over 46 years using a 2% inflation rate.
5. Sum years 1 through 46 to produce a lifetime Net Present Value using a 3.5% discount rate.

Notes and Limitations of Individual Earnings Methodology

1. As with the tax revenue estimate, assuming that high school graduates did not go on to additional years of school makes our income disparity estimates quite conservative.
2. As previously noted in the prior section, we did not make any assumptions about residual effects on educational attainment (and therefore income/tax revenue) among peers already graduating from high school who may go on to additional attainment given a changed peer dynamic. There is some evidence to suggest that peer achievement and expectations do play a role in influencing educational attainment, particularly among low-achieving peers.[89]

APPENDIX C: TABLES FOR REPORT FIGURES

FIGURE 2: PREVALENCE OF HEALTHY BEHAVIORS OR FACTORS AMONG OREGON STUDENTS

	8TH GRADE (N=5,347)	11TH GRADE (N=3,545)	p-VALUE†
Good Grades in School: As and Bs	69.2%	67.6%	p=0.38
Meets Positive Youth Development Benchmark*	63.6%	68.9%	p<0.01
Had Enough Food to Eat	83.6%	81.9%	p=0.27
Ate 5 or More Fruits/ Vegetables Daily	21.3%	17.6%	p<0.05
Ate Breakfast Daily	41.7%	35.4%	p<0.01
Drank 3 or Less Sodas Weekly	61.4%	61.5%	p=0.95
Physical Activity 60 Minutes, 5 Days Weekly	57.5%	44.3%	p<0.001
Not Overweight	73.4%	76.5%	p=0.11
Not Depressed	80.9%	79.1%	p=0.12
No Current Cigarette Smoking	90.1%	85.1%	p<0.001
Not Feeling Harassed at School	59.2%	72.6%	p<0.001

Source: Oregon Healthy Teens Survey, 2009.

**Positive Youth Development Benchmark* is a combined measure that incorporates physical and emotional health, adult connection, community involvement, and self-efficacy.

†p-value is for chi-square test of difference between grades 8 and 11 (95% confidence level).

FIGURE 3: SUFFICIENT PHYSICAL ACTIVITY AND SCHOOL-BASED PHYSICAL EDUCATION (PE) PROGRAMS, 8TH AND 11TH GRADES

	8TH GRADE (N=5,347)	11TH GRADE (N=3,545)	p-VALUE†
Physical Activity 60 Minutes, 5 Days Weekly	57.5%	44.3%	p<0.001
P.E. for 30 Minutes, 5 Days a Week	35.0%	10.1%	p<0.001

Source: Oregon Healthy Teens Survey, 2009.

†p-value is for chi-square test of difference between grades 8 and 11.

FIGURE 4: PERCENTAGE OF STUDENTS WITH GOOD GRADES (AS AND BS) IN SCHOOL BY PRESENCE OR ABSENCE OF HEALTHY FACTORS

	8TH GRADE (N=5,347)			11TH GRAD	
	With Healthy Behavior	WITHOUT Healthy Behavior	p-value†	With Healthy Behavior	WI He Be
Met Positive Youth Benchmark*	78.4%	55.6%	p<0.001	74.7%	5
Had Enough Food to Eat	71.5%	61.2%	p<0.01	70.9%	5
Ate 5 or More Fruits/ Vegetables Daily	71.4%	69.5%	p=0.32	73.9%	6
Ate Breakfast Daily	79.2%	63.3%	p<0.001	78.1%	6
Drank 3 or Fewer Sodas Weekly	74.4%	62.5%	p<0.001	72.8%	5
Physical Activity 60 Minutes, 5 Days Weekly	74.0%	64.0 %	p<0.001	69.2%	6
Not Overweight	73.1%	64.1%	p<0.001	70.7%	5
Not Depressed	72.9%	57.8%	p<0.001	70.8%	5
Not Smoking Cigarettes	73.2%	42.6%	p<0.001	70.9%	5
Not Harassed at School	71.7%	67.2%	p=0.02	69.9%	6

Source: Oregon Healthy Teens Survey, 2009.

**Positive Youth Development Benchmark* is a combined measure that incorporates physical and emotional health, community support, and self-efficacy.

†p-value is for chi-square test of association between getting good grades and having or not having a healthy behavior, stratified by grades 8 and 11.

FIGURE 5: PERCENTAGE OF STUDENTS WITH GOOD GRADES IN SCHOOL BY NUMBER OF POSITIVE HEALTH FACTORS

NUMBER POSITIVE HEALTH FACTORS	8TH GRADE (N=13,536)		11TH GRADE (N=14,925)	
	% with number health factors	% getting good grades	% with number health factors	% getting good grades
0	0.1%	33.3%	0.2%	29.6%
1	0.9%	49.7%	1.0%	34.7%
2	3.7%	48.5%	3.7%	46.5%
3	7.1%	56.6%	8.4%	54.7%
4	13.2%	62.0%	14.8%	58.9%
5	18.8%	72.4%	20.4%	67.7%
6	21.8%	79.8%	22.8%	77.0%
7	19.9%	83.6%	17.3%	82.1%
8	11.5%	89.4%	9.1%	86.8%
9	3.1%	93.9%	2.3%	91.6%
Odds Ratio for outcome of good grades predicted by number of health factors (95% confidence interval)	1.4 (1.4, 1.5)		1.4 (1.4, 1.5)	
Average Number positive health factors (95% confidence interval)	5.63 (5.59, 5.67)		5.44 (5.41, 5.48)	

Source: Oregon Healthy Teens Survey, 2006–2009 combined.

Note: Positive Healthy Behaviors includes the sum of up to 9 factors (sufficient fruit/vegetable consumption, eating breakfast, drinking fewer sodas, sufficient physical activity, maintaining a healthy weight, not experiencing depression, not smoking cigarettes, not feeling harassed at school, and meeting the Positive Youth Development Benchmark — measure of having enough food to eat was not included because this question was only asked on the 2009 survey). Youth who did not answer all 9 health behavior questions were excluded from this analysis (7,351 8th-graders and 3,158 11th-graders were excluded for this reason).

Findings: Using a logistic regression model with both grades (adjusted for grade and gender), the percentage of students getting good grades is significantly associated with the number of healthy behaviors (coefficient 7.1 (95% ci: 6.7–7.6, p<0.001).

The question of differential impact of specific health behaviors on academic performance is an area of further research.

FIGURE 6: ON-TIME (4-YEAR) OREGON HIGH SCHOOL GRADUATION RATE, BY DEMOGRAPHIC FACTORS

GROUP	ON-TIME GRADUATION RATE
TOTAL	**66.4%**
Race/ethnicity	
White*	69.9%
American Indian/Alaska Native*	50.3%
Asian/Pacific Islander*	76.1%
Black/African American*	49.8%
Hispanic	55.2%
Gender	
Female	70.8%
Male	62.3%
Socioeconomic Status (SES)	
Economically Disadvantaged	59.8%
Not Economically Disadvantaged	72.1%
Acculturation	
Limited English Proficiency	49.7%
Not Limited English Proficiency	68.0%

*Non-Hispanic

Source: Oregon Department of Education, Graduating Class of 2009–2010.

Notes: "On-time graduation rate" is the percent of graduates, calculated as the number of students earning a regular diploma within four years, divided by the number who entered high school four years previously (adjusted for students who transfer in/out of the public school system, left the state or country, or who are deceased).

"Economically disadvantaged" means that the student is eligible or participating in the free and reduced lunch program.

"Limited English proficiency" is a flag applied to a student record and may or may not indicate that the student is enrolled in the English as a Second Language (ESL) program. Available at: www.ode.state.or.us/wma/data/schoolanddistrict/students/docs/summarycohortgrad1011.pdf.

FIGURE 7: PERCENTAGE OF STUDENTS GETTING GOOD GRADES IN SCHOOL BY RACE/ETHNICITY, 8TH AND 11TH GRADES

	8TH GRADE			11TH GRADE		
	N	% good grades	Adjusted Odds Ratio (95% CI)	N	% good grades	Adjusted Odds Ratio (95% CI)
White (non-Hispanic)	10,853	76.9%	Referent group	12,324	73.4%	Referent group
American Indian/Alaska Native (non-Hispanic)	559	52.7%	0.34 [0.26, 0.44]	387	54.8%	0.45 [0.34, 0.60]
Asian (non-Hispanic)	577	87.4%	2.1 [1.6, 2.9]	601	86.3%	2.3 [1.6, 3.2]
Black/African American (non-Hispanic)	397	66.8%	0.61 [0.46, 0.81]	301	64.7%	0.68 [0.50, 0.94]
Pacific Islander (non-Hispanic)	191	73.6%	0.89 [0.58, 1.4]	168	66.1%	0.74 [0.45, 1.2]
Multiple Race (non-Hispanic)	973	71.2%	0.73 [0.58, 0.92]	637	68.7%	0.79 [0.62, 1.0]
Hispanic	3,019	62.9%	0.50 [0.44, 0.57]	2,415	56.9%	0.48 [0.42, 0.54]

Source: Oregon Healthy Teens Survey, 2006–2009 combined.

Note: Odds ratios for differences between "good grades" by race from non-Hispanic white students were determined using logistic regression models where good grades were the outcome, adjusted for gender and stratified by grade.

Findings: For both 8th and 11th grades, good grades are significantly ($p<0.05$) higher among Asian than white non-Hispanic youth, and lower for American Indian/Alaska Native, Black/African American, Hispanic, and multi-race non-Hispanic youth vs. white non-Hispanic youth.

FIGURE 8: PERCENTAGE OF STUDENTS WITH GOOD GRADES IN SCHOOL BY GENDER AND SEXUAL ORIENTATION, 8TH AND 11TH GRADES

	8TH GRADE		11TH GRADE		
	N	% good grades	N	% good grades	Odds Ratio† (95% CI)
Female	8,766	78.3%	8,735	75.6%	--
Female — Heterosexual/ Straight	n/a	n/a	7,488	76.4%	Referent group
Female — Lesbian, Bisexual, unsure	n/a	n/a	386	66.9%	[0.50, 0.79]
Male	8,014	67.9%	7,874	65.3%	--
Male — Heterosexual/Straight	n/a	n/a	8,056	65.9%	Referent group
Male — Gay, Bisexual, unsure	n/a	n/a	679	62.4%	[0.65, 1.1]
Odds Ratio§ for outcome of good grades, with gender as predictor (female is referent group)		0.6 [0.5, 0.7]		0.6 [0.6, 0.7]	

n/a = not available

Source: Oregon Healthy Teens Survey, 2006–2009 combined.

Notes: †Odds ratios are gender stratified, for 11th grade only, and not adjusted for other factors.

§ Odds ratio for association between good grades and gender, within grade, with female as the referent group. Sexual orientation was not included in this model.

Sexual orientation questions are not asked of 8th-graders, and 8th-grade data are not shown in Figure 8 within the report narrative.

FIGURE 9: PERCENTAGE OF STUDENTS WITH GOOD GRADES IN SCHOOLBY HEALTHY FACTORS, AND AVERAGE HEALTHY FACTORS, BY RACE AND ETHNICITY, 11TH GRADE

NUMBER POSITIVE HEALTH FACTORS	WHITE* (N=10,994)		AMERICAN INDIAN/ ALASKA NATIVE* (N=318)		ASIAN* (N=512)		BLACK OR AFRICAN AMERICAN* (N=232)		PACIFIC ISLANDER* (N=132)		MULTIPLE RACE* (N=562)		ANY HISPANIC (N=2,004)	
	%	N	%	N	%	N	%	N	%	N	%	N	%	N
0	34.5	21	0.0	1	0.0	0	0.0	0	0.0	0	0.0	1	21.8	3
1	38.2	110	18.8	7	100.0	2	7.6	4	0.0	2	50.2	5	34.6	24
2	49.7	378	19.6	13	41.9	16	30.7	5	34.9	7	43.7	28	42.2	100
3	57.6	880	53.5	33	72.1	30	72.8	13	100.0	5	47.0	53	39.2	212
4	59.6	1537	63.4	55	86.1	58	40.6	40	87.8	17	60.8	88	50.7	344
5	69.3	2171	53.2	75	93.8	118	68.8	63	66.5	26	59.1	117	54.0	414
6	79.5	2505	57.9	76	82.0	138	68.7	55	64.9	36	75.3	125	65.7	428
7	84.4	1978	53.6	40	94.7	90	83.2	35	71.6	23	83.9	86	69.7	324
8	88.7	1139	76.1	12	91.5	49	59.2	15	66.3	12	95.1	47	74.0	130
9	94.0	275	100.0	6	79.3	11	89.1	2	88.9	4	94.8	12	73.7	25
Average Healthy Factors (95% confidence interval)	5.5 [5.5, 5.6]		5.1 [4.8, 5.4]		5.5 [5.3, 5.7]		5.4 [5.1, 5.7]		5.1 [4.6, 5.6]		5.3 [5.1, 5.5]		5.2 [5.1, 5.3]	
Odds Ratio (95% confidence interval)	1.5 [1.4, 1.5]		1.3 [1.03, 1.5]		1.4 [1.06, 1.9]		1.3 [1.0, 1.7]		1.3 [0.9, 1.8]		1.5 [1.3, 1.8]		1.3 [1.2, 1.4]	

*Non-Hispanic

Source: Oregon Healthy Teens Survey, 2006–2009 combined.

Notes: Results for Pacific Islander students are not shown in narrative chart due to small numbers. Linear regression lines for association between healthy factors and good grades are shown in narrative charts. "Dots" in charts represent the average number of healthy factors within the group.

Analyses: Odds ratios are for good grades as the (binary) outcome with number of healthy factors as a predictor, adjusted for gender.

continued on next page

Findings: Statistical tests for differences in trend between minority and white non-Hispanic youth were not significant (in other words, slopes are statistically the same for different groups).

FIGURE 13: CONTINUED

	MIDDLE SCHOOL (MS) N=126			HIGH SCHOOL (HS) N=106			ODDS RATIO* (95% CI)
	With Core Capacity (N=13)	**WithOUT Core Capacity (N=113)**	**p-value†**	**With Core Capacity (N=14)**	**WithOUT Core Capacity (N=92)**	**p-value†**	
Communication of Tobacco-free Policies and Procedures to Handle Violations	31.1%	12.6%	p=0.12	23.2%	13.4%	p=0.36	2.6 [0.9, 7.4]
Tobacco Prevention Messages Shared and Coordinated with Community	50.0%	14.0%	p=0.002	34.4%	18.3%	p=0.17	4.4 [1.7, 11.3]
Tobacco Cessation for Students and Staff	46.5%	26.4%	p=0.13	34.3%	26.6%	p=0.55	1.9 [0.8, 4.5]
Bullying Prevention Program	92.6%	80.0%	p=0.27	83.5%	58.8%	p=0.10	3.3 [0.9, 12.4]
All Health Teachers have Certification, Licensure or Endorsement in Health Education	71.7%	55.9%	p=0.32	91.7%	86.7%	p=0.62	1.7 [0.4, 6.4]

Source: Oregon School Health Profiles Survey, 2010.

Note: †p-value is for chi-square test of difference in outcome (presence of policy/program) between schools with or without Core Capacity components (95% confidence level). Significant associations (p<0.05) shown in bold.

*Odds ratio is for association of Core Capacity as a predictor with outcome of effective health policy/program, adjusted by school type and percent free/reduced lunch (as a proxy for student/community socioeconomic status).

FIGURE 10: AVERAGE # OF HEALTHY FACTORS BY SEXUAL ORIENTATION AND GOOD GRADES IN SCHOOL, 11TH GRADE

MEAN NUMBER POSITIVE HEALTH FACTORS	STRAIGHT (N=13,919)		GAY/BI/QUESTIONING (N=926)	
	Average #	95% CI	Average #	95% CI
Good grades (As/Bs)	5.8	5.8, 5.9	4.8	4.6, 5.0
Not Good Grades (Cs/Ds/Fs)	4.8	4.8, 4.9	3.7	3.4, 4.0

Source: Oregon Healthy Teens Survey, 2006–2009 combined.

FIGURE 11: PERCENTAGE OF SCHOOLS WITH INDIVIDUAL SCHOOL HEALTH CORE CAPACITY COMPONENT MEASURES

	MIDDLE SCHOOL (MS) (N=126)	HIGH SCHOOL (HS) (N=106)	TOTAL (N=232)	p-VALUE†
Designation of a school health program coordinator	77.7%	82.5%	79.7%	p=0.39
Conducting at least one health-related school-based assessment	39.1%	43.9%	41.2%	p=0.47
Having at least one health-related school improvement plan (SIP) goal	75.6%	73.3%	74.6%	p=0.69
Having a school health advisory group that includes a school administrator and at least one community member	17.1%	28.4%	21.7%	p=0.05

Source: Oregon School Health Profiles Survey, 2010.

Note: †p-value is for chi-square test of difference between middle schools and high schools with Core Capacity components (95% confidence level). Reported percentages are weighted to account for school district size. Schools that reported "don't know" for any item were removed from the denominator in this table.

FIGURE 12: PERCENTAGE OF OREGON SCHOOLS WITH NUMBER OF SCHOOL HEALTH CORE CAPACITY COMPONENTS

	MIDDLE SCHOOL (MS) (N=126)	HIGH SCHOOL (HS) (N=106)	TOTAL (N=232)
Zero-One Component	28.5%	31.3%	29.7%
Two Components	43.1%	26.7%	36.2%
Three Components	18.6%	29.2%	23.0%
Core Capacity (All Four Components)	9.8%	12.9%	11.1%
Average number of components	2.1 (1.9–2.3)	2.2 (2.0–2.4)	2.2 (2.0–2.3)

Source: Oregon School Health Profiles Survey, 2010.

Notes: 1 middle school and 1 high school were deleted from totals because they did not have information on all components. Presence of Core Capacity was tested for association with school type (MS/HS), school size (student enrollment), socioeconomic status of students (percent free and reduced lunch enrollment), and community type (using RUCA designations for urban/rural community type). None of these covariates were significantly associated with presence of Core Capacity individually or in a full model.

FIGURE 13: PERCENTAGE OF OREGON SCHOOLS WITH EFFECTIVE HEALTH POLICIES OR PROGRAMS, BY PRESENCE/ABSENCE OF SCHOOL HEALTH CORE CAPACITY

	MIDDLE SCHOOL (MS) N=126			HIGH SCHOOL (H N=106	
	With Core Capacity (N=13)	WithOUT Core Capacity (N=113)	p-value†	With Core Capacity (N=14)	WithOUT Core Capacity (N=92)
PE Teacher Received Professional Development	76.5%	72.8%	p=0.78	100.0%	73.0%
PE Teacher Provided Goals, Written Curricula, Scope and Assessment Plan	92.0%	51.1%	p=0.01	85.2%	54.0%
Students are Not Allowed Exemptions from Required PE	82.1%	63.7%	p=0.22	50.9%	55.7%
Intramural Activities and Clubs are Offered to All Students	75.3%	69.8%	p=0.69	91.7%	51.9%
[illegible] School Hours	100.0%	88.5%	p=0.21	91.7%	77.4%
Only Nutritious Foods and Beverages Sold Outside School Food Service Program	45.4%	71.9%	p=0.05	8.3%	18.3%
Fruits and Vegetables Offered in Vending Machines, School Stores and at Celebrations	24.1%	5.3%	p=0.02	49.1%	13.3%

REFERENCES

1. Freudenberg, Nicholas, and Jessica Ruglis. Reframing school dropout as a public health issue. Preventing Chronic Disease: Public Health Research, Practice and Policy. 2007; 4(4): 1–11. Available at: www.cdc.gov/pcd/issues/2007/oct/pdf/07_0063.pdf. Accessed on 4/20/13.
2. Ibid.
3. Basch, Charles E. Healthier students are better learners: A missing link in school reforms to close the achievement gap. Journal of School Health. 2011; 81(10): 593–98.
4. Bradley, Beverly J., and Amy C. Greene. Do health and education agencies in the United States share responsibility for academic achievement and health? A review of 25 years of evidence about the relationship of adolescents' academic achievement and health behaviors. Journal of Adolescent Health. 2013. 52: 523-532.
5. Oregon Department of Education. Statewide report card: An annual report to the legislature on Oregon public schools 2011–2012. 2012; 62. Available at: www.ode.state.or.us/search/page/?id=1821. Accessed 1/11/13.
6. Robert Wood Johnson Foundation. Overcoming obstacles to health. 2008. Available at: www.commissiononhealth.org/PDF/ObstaclesToHealth-Report.pdf. Accessed 7/11/12.
7. Powers, Laurie E., and Sarah Geenen. Dropping out of school: Problems and solutions. Transition Toolbox. 2007. Oregon Department of Education, Salem, OR.
8. Marder, Michael P. Failure of U.S. public secondary schools in mathematics: Poverty is a more important cause than teacher quality. 2011. Available at: http://uteachweb.cns.utexas.edu/sites/default/files/BrokenEducation2011.pdf. Accessed 7/10/11.
9. Freudenberg, Nicholas, and Jessica Ruglis. (2007). Reframing school dropout as a public health issue. Preventing Chronic Disease: Public Health Research, Practice and Policy. 2007; 4(4): 1–11. Available at: www.cdc.gov/pcd/issues/2007/oct/07_0063.htm. Accessed 11/27/11.
10. U.S. Department of Health and Human Services. Office of Disease Prevention and Health Promotion. Healthy People 2020. Washington, D.C. Adolescent health objectives. Available at: www.healthypeople.gov/2020/topicsobjectives2020/objectiveslist.aspx?topicId=2. Last accessed 7/18/12.
11. Basch, Charles E. Healthier students are better learners: High-quality, strategically planned, and effectively coordinated school health programs must be a fundamental mission of schools to help close the achievement gap. Journal of School Health. 2011; 81(10): 650–662.
12. Centers for Disease Control and Prevention. Adolescent and school health, registries of programs effective in reducing youth risk behaviors. Available at: www.cdc.gov/healthyyouth/adolescenthealth/registries.htm. Accessed 5/16/13.
13. Centers for Disease Control and Prevention. Adolescent and school health. CDC.gov. Available at: www.cdc.gov/healthyyouth/cshp/components.htm.
14. Basch, Charles E. Healthier students are better learners: High-quality, strategically planned, and effectively coordinated school health programs must be a fundamental mission of schools to help close the achievement gap. Journal of School Health. 2011; 81(10): 650–662.
15. Basch, Charles E. Healthier students are better learners: A missing link in school reforms to close the achievement gap. Journal of School Health. 2011; 81(10): 593–598.
16. Basch, Charles E. Healthier students are better learners: A missing link in school reforms to close the achievement gap. Equity Matters, Vol. 6. 2010. Available at: www.equitycampaign.org/i/a/document/12557_EquityMattersVol6_Web03082010.pdf. Accessed 12/12/10.
17. Prata, Adriana, Robert Nystrom, Inge Aldersebaes, and Gary English. Healthy kids learn better: Lessons learned from Oregon's coordinated school health project. Unpublished manuscript, State of Oregon Public Health Division and Department of Education. 2007.
18. Oregon Public Broadcasting. Kitzhaber enters session on a roll. January 9, 2013. Available at: www.opb.org/news/article/n3-kitzhaber-enters-session-on-a-roll/. Accessed 1/11/13.
19. Bernat, Debra Hilkene, and Michael D. Resnick. Healthy youth development: Science and strategies. Journal of Public Health Management Practice, 12, S32–S40. 2006.
20. Eccles, Jacquelynne, and Jennifer Gootman. (2002). Community programs to promote youth development. Washington, D.C.: National Academy Press, 2002.
21. Roth, Jodie L., and Jeanne Brooks-Gunn. Youth development programs: Risk, prevention, and policy. Journal of Adolescent Health, 32(3), 2003. 170–182.

22. Nystrom, Robert, Adriana Prata, and Sarah Ramowski. Measuring positive youth development: The development of a state benchmark. Journal of Youth Development. 2008; 3(1). Available at: http://cyfernetsearch.org/sites/default/files/journal_of_youth_development_oregon_pyd_benchmark.pdf.
23. Milteer, Regina M., M.D., and Kenneth R. Ginsburg, M.D. Council on Communications and Media and Committee on Psychosocial Aspects of Child and Family Health. The importance of play in promoting healthy child development and maintaining strong parent-child bond: focus on children in poverty. Pediatrics. 2012; 129(1). Available at: http://pediatrics.aappublications.org/content/129/1/e204.full. Accessed 4/24/13.
24. Centers for Disease Control and Prevention. Adolescent and School Health. CDC.gov. Available at: www.cdc.gov/healthyyouth/cshp/case.htm. Accessed: 4/30/13.
25. Shendell, Derek G., Robert Prill, William J. Fisk, Michael G. Apte, David Blake, and David Faulkner. Associations between classroom CO_2 concentrations and student attendance in Washington and Idaho. Indoor Air. 2004; 14: 333–341.
26. Taber, Daniel R., Jamie F. Chriqui, Frank M. Perna, Lisa M. Powell, and Frank J. Chaloupka. (2012). Weight status among adolescents in states that govern competitive food nutrition content. Pediatrics. Aug. 13. [E-pub ahead of print] Available at: www.ihrp.uic.edu/content/news-strong-state-laws-school-snacks-drinks-may-help-prevent-weight-gain-new-study-finds. Accessed 8/20/12.
27. CDC effectiveness of school-based programs as a component of a statewide tobacco control initiative: Oregon, 1999–2000. Morbidity and Mortality Weekly Report (MMWR). 2001; 50(31): 663–666. Available at: www.cdc.gov/mmwr/preview/mmwrhtml/mm5031a3.htm.
28. U.S. Department of Education, Office of Special Education Programs National Technical Assistance Center on Positive Behavioral Interventions and Supports. School-wide PBIS. Available at: www.pbis.org/school/default.aspx. 2013. Accessed 1/11/13.
29. Meadows, Emily, and Nicole LeSaux. A systematic review of the effectiveness of antimicrobial rinse-free hand sanitizers for prevention of illness-related absenteeism in elementary school children. BMC Public Health. 4(50). 2004.
30. CDC community guide to preventive services, violence prevention focused on children and youth. Available at: www.thecommunityguide.org/violence/index.html. Accessed 9/12/12.
31. CDC community guide to preventive services, universally recommended vaccinations: Vaccination programs in schools and organized child care centers. Available at: www.thecommunityguide.org/vaccines/universally/schools_childcare.html. Accessed 8/20/12.
32. McNall, Miles A., Lauren F. Lichty, and Brian Mavis. The impact of school-based health centers on the health outcomes of middle and high school students. American Journal of Public Health, 100, (9), 1604–1610. 2010.
33. CDC community guide to preventive services, preventing dental caries: School-based or -linked sealant delivery programs. Available at: www.thecommunityguide.org/oral/schoolsealants.html. Accessed 8/20/12.
34. CDC guide to community preventive services, behavioral and social approaches to increase physical activity: Enhanced school-based physical education. Available at: www.thecommunityguide.org/pa/behavioral-social/schoolbased-pe.html. Accessed 8/20/12.
35. Collaborative for academic, social, and emotional learning. Safe and sound: An educational leader's guide to evidence-based social and emotional learning (SEL) programs. 2003.
36. CDC community guide to preventive services. Prevention of HIV/AIDS, other STIs and pregnancy: Group-based comprehensive risk reduction interventions for adolescents. Available at: www.thecommunityguide.org/hiv/riskreduction.html. Accessed 8/20/12.
37. United States Department of Agriculture (USDA), Food and Nutrition Services. School breakfast program. Available at: www.fns.usda.gov/cnd/breakfast/. Accessed 10/20/12.
38. American Cancer Society. National action plan for comprehensive school health education. 1992; 5.
39. Centers for Disease Control and Prevention. Division of Adolescent and School Health (DASH). Health and academics. Available at: www.cdc.gov/HealthyYouth/health_and_academics/index.htm. Accessed 11/6/12.
40. Basch, Charles E. Executive summary: Healthier students are better learners. Journal of School Health. 2011; 81(10): 591–592.
41. California Healthy Kids. What is the relationship of student health to academic achievement? Available at: www.cdph.ca.gov/programs/cpns/Documents/CHKRC-RelationshipofStudentHealth.pdf. Accessed 11/21/11.
42. California Endowment, the James Irvine Foundation, The Williams and Flora Hewlett Foundation. Healthy steps toward student achievement: Research-based recommendations for policy and practice. Being well, learning well, the California healthy students research project. 2011. Available at: www.childrennow.org/uploads/documents/bwlw2011_healthy_steps_synthesis.pdf. Accessed 11/30/11.

43. Dilley, Julia A. Healthy students, successful students: How school-based health interventions can improve academic success. Washington State Board of Health. 2009. Available at: http://healthyschools.ospi.k12.wa.us/waschool/data_tools/academics_health.html. Accessed 12/1/11.
44. Hishinuma, Earl S., Janice Y. Chang, John J. McArdle, and Fumiaki Hamagami. Potential causal relationship between depressive symptoms and academic achievement in the Hawaiian high schools health survey using contemporary longitudinal latent variable change models. Developmental Psychology. 2012, Jan. 23. [Epub ahead of print.]
45. Basch, Charles E. Breakfast and the achievement gap among urban minority youth. Journal of School Health. 2011. Oct.; 81(10): 635–640. doi: 10.1111/j.1746-1561.2011.00638.x.
46. Jackson, Stephanie L., William F. Vann, Jonathan B. Kotch, Bhavna T. Pahel, and Jessica Y. Lee. Impact of poor oral health on children's school attendance and performance. American Journal of Public Health. 2011; 101(10): 1900–1906.
47. Basch, Charles E. Executive summary: Healthier students are better learners. Journal of School Health. 2011; 81(10): 591–593.
48. Fiscella, Kevin, and Harriet Kitzman. Disparities in academic achievement and health: The intersection of child education and health policy. Pediatrics. 2009; 123(3): 1073–1080.
49. Basch, Charles E. Healthier students are better learners: A missing link in school reforms to close the achievement gap. Equity Matters: Research Review No. 6. Teachers College, Columbia University. 2010. Available at: www.equitycampaign.org/i/a/document/12557_EquityMattersVol6_Web03082010.pdf. Accessed 11/15/11.
50. Ibid.
51. Oregon Health Authority. Oregon health improvement plan. Available at: http://public.health.oregon.gov/ProviderPartnerResources/HealthSystemTransformation/OregonHealthImprovementPlan/Pages/index.aspx.
52. Ross, Catherine E., and John Mirowsky. The interaction of personal and parental education on health. Social Science & Medicine. 2011; 72: 591–599.
53. Oregon Department of Education, Statewide 2010–11 four year cohort graduation rates. Available at: www.ode.state.or.us/wma/data/schoolanddistrict/students/docs/summarycohortgrad1011.pdf. Accessed 11/16/12.
54. American Psychological Association. Education and socioeconomic status. Available at: www.apa.org/pi/ses/resources/publications/factsheet-education.aspx. Accessed 11/16/12.
55. National Center for Education Statistics. (2008). Percentage of high school dropouts among persons 16 through 24 years old (status dropout rate), by income level, and percentage distribution of status dropouts, by labor force status and educational attainment: 1970 through 2007. 2008. Available at: http://nces.ed.gov/programs/digest/d08/tables/dt08_110.asp. Accessed 11/8/12.
56. Hauser, Robert M., and Judith Anderson Koenig. (Eds). High school dropout, graduation, and completion rates: Better data, better measures, better decisions. Committee for improved measurement of high school dropout and completion rates: Expert guidance on next steps for research and policy workshop; National Research Council and National Academy of Education. 2011. Available at: www.nap.edu/catalog.php?record_id=13035. Accessed 11/16/12.
57. Levin, Henry, Clive Belfield, Peter Muennig, and Cecelia Rouse. (2007). The costs and benefits of an excellent education of all of America's children. Available at: www.literacycooperative.org/documents/thecostsandbenefitsofanexcellentedforamerchildren.pdf. Accessed 11/16/12.
58. Lochner, Lance, and Enrico Moretti. The effect of education on crime: Evidence from prison inmates, arrests, and self-reports. No. w8605. National Bureau of Economic Research, 2001. Available at: www.nber.org/papers/w8605. Accessed 5/1/13.
59. Townsend, Lisa, Alan J. Flisher, and Gary King. A systematic review of the relationship between high school dropout and substance use. Clinical Child and Family Psychology Review. 2007. 10, (4), 295–317.
60. House, Emily. Oregon's high school dropouts: Examining the economic and social costs. Cascade Policy Institute and The Foundation for Educational Choice. 2010. Available at: www.edchoice.org/CMSModules/EdChoice/FileLibrary/494/Oregon-s-High-School-Dropouts---Examining-the-economic-and-social-costs.pdf. Accessed 11/16/12.
61. Ross, Catherine E., and John Mirowsky. The interaction of personal and parental education on health. Social Science & Medicine, 2011. 72, (4), 591–599.
62. Basch, Charles E. Healthier students are better learners: High-quality, strategically planned, and effectively coordinated school health programs must be a fundamental mission of schools to help close the achievement gap. Journal of School Health. 2011; 81(10): 650–62.

63. Ibid.
64. Prata, Adriana, Robert Nystrom, Inge Aldersebaes, and Gary English. Healthy kids learn better: Lessons learned from Oregon's coordinated school health project. Unpublished manuscript, State of Oregon Public Health Division and Department of Education. 2007.
65. Valois, Robert F., Sean Slade, and Ellie Ashford. (2011). Healthy school communities model: Aligning health and education in the school setting. ASCD. Available at: www.ascd.org/ASCD/pdf/siteASCD/publications/Aligning-Health-Education.pdf. Accessed 11/16/12.
66. Bradley, Beverly J., and Amy C. Greene. Do health and education agencies in the United States share responsibility for academic achievement and health? A review of 25 years of evidence about the relationship of adolescents' academic achievement and health behaviors. Journal of Adolescent Health. 2013; 52: 523–532.
67. Basch, Charles E. Executive summary: Healthier students are better learners. Journal of School Health. 2011; 81(10): 591–593.
68. Moreno, Danielle, and Lisa Houston. Smoking in low socioeconomic status populations. Break Free Alliance. 2009. Available at: http://healthedcouncil.org/ADEPTReport.pdf. Accessed 7/29/12.
69. Fletcher, Jason M., and Michael R. Richards. Diabetes's 'health shock' to schooling and earnings: Increased dropout rates and lower wages and employment in young adults. Health Affairs (Millwood). January 2012; 31(1): 27–34.
70. Alliance for Excellent Education. Healthier and wealthier: Decreasing health care costs by increasing educational attainment. Washington, D.C.; November 2006. Available at: www.all4ed.org/files/Oregon_seb.pdf. Accessed 1/30/13. (Note: Oregon figure was adjusted for inflation and reported in 2010 dollars.)
71. Oregon State Bar Bulletin. Putting the class in the classroom. 2007. Available at: www.osbar.org/publications/bulletin/07jul/classroom.html. Accessed 7/19/12.
72. Alliance for Excellent Education. Saving futures, saving dollars. Washington, D.C.: August 2006. Available at: www.all4ed.org/files/SavingFutures.pdf.
73. Levin, Henry, et al. The costs and benefits of an excellent education for all of America's children. 2007. Center for Cost-Benefit Studies of Education Teachers College, Columbia University.
74. Alliance for Excellent Education. Education and the economy: Boosting Oregon's economy by improving high school graduation rates. 2011. Available at: www.all4ed.org/files/Oregon_seb.pdf. Accessed 7/19/12.
75. Alliance for Excellent Education (2007). Hidden benefits: The impact of high school graduation on household wealth. Washington, D.C. Available at: www.all4ed.org/files/hiddenbenefits.pdf.
76. Taras, Howard, Paula Duncan, Doris Luckbill, Judy Robinson, Lani Wheeler, and Susan Wooley, eds. Health, mental health, and safety guidelines for schools. American Academy of Pediatrics. 2004.
77. American Cancer Society, Inc. Improving school health: A guide to the role of the school health coordinator. American Cancer Society. 1999.
78. Oregon School Board Assocation. 2011–2012 Survey: Salaries, economic benefits and selected policies for teachers in Oregon school districts. 2012. Available at: www.osba.org/~/media/Files/Resources/Employee%20Management/2011-12_Salary_Survey_book_rev.pdf. Accessed 7/19/12.
79. Lochner, Lance, and Enrico Moretti. The effect of education on crime: Evidence from prison inmates, arrests, and self-reports. No. w8605. National Bureau of Economic Research, 2001. Available at: www.nber.org/papers/w8605. Accessed 5/1/13.
80. Oregon Department of Education. Diploma-credit requirements. Available at: www.ode.state.or.us/search/page/?id=1681. Accessed 4/30/13.
81. Dilley, Julia A. Healthy students, successful students: How school-based health interventions can improve academic success. Washington State Board of Health. 2009. Available at: http://healthyschools.ospi.k12.wa.us/waschool/data_tools/academics_health.html. Accessed 12/1/11.
82. Vinciullo, Frances M., and Beverley J. Bradley. A correlational study of the relationship between a coordinated school health program and school achievement: A case for school health. The Journal of School Nursing. 2009 Dec.; 25(6): 453–465.
83. Lochner, Lance, and Enrico Moretti. The effect of education on crime: Evidence from prison inmates, arrests, and self-reports. No. w8605. National Bureau of Economic Research, 2001. Available at: www.nber.org/papers/w8605. Accessed 5/1/13.
84. Oregon State Police. Statewide arrest information section 6. Available at: www.oregon.gov/osp/CJIS/docs/2010/section_6_statewide_arrest_information_2010.pdf. Accessed 7/20/12.

85. Bureau of Justice Statistics. Data generated from: http://bjs.ojp.usdoj.gov/index.cfm?ty=nvat. Accessed 7/20/12.
86. Miller, Ted R., Mark A. Cohen, and Brian Wiersema (1996). Victim costs and consequences: A new look. National Institute of Justice Research Report. U.S. Department of Justice. Available at: www.ncjrs.gov/pdffiles/victcost.pdf. Accessed 5/16/13.
87. Correctional spending trends. (2011). Oregon Legislative Fiscal Office. Available at: www.leg.state.or.us/comm/lfo/correctional_spending_trends_2011.pdf.
88. Zimmer, Ron W., and Eugenia F. Toma. Peer effects in private and public schools across countries. Journal of Policy Analysis and Management. 2000. 19(1): 75–92.
89. Ibid.

This document can be provided upon request in an alternate format for individuals with disabilities or in a language other than English for people with limited English skills. To request this publication in another format or language, call 971-673-0271.

OHA 9601 (7/2013)