

Executive Summary: Health Impact Review of S-0746.1/17

Prohibiting Assigning Homework in Grades Kindergarten through Three

It is unclear if S-0746.1/17 has the potential to improve educational outcomes and decrease educational opportunity gaps among students in kindergarten through third grade. There is very strong evidence to demonstrate associations between educational outcomes and educational attainment, income, health, and health disparities. However, because the potential impact of this bill on educational outcomes is unclear, directionality of downstream impacts cannot be determined.

DRAFT BILL INFORMATION

Summary of Draft Bill:

- Prohibits the use of formally assigned homework in kindergarten through third grade.

HEALTH IMPACT REVIEW

Summary of Findings:

This Health Impact Review found the following evidence regarding the provisions in S-0746.1/17:

- Unclear evidence for the bill's impacts on educational outcomes and educational opportunity gaps for students in kindergarten through third grade. Relevant literature is discussed in further detail in the full Health Impact Review.
- Evidence in the literature demonstrates that very strong associations do exist between educational outcomes, educational attainment, earning potential and income, health, and health disparities. This Health Impact Review outlines the evidence for each of these associations based on the understanding that the direction of the associations will be dependent on whether or not the provisions of S-0746.1/17 have a positive or negative impact on educational outcomes for students in grades K-3.

For more information contact:
(360)-236-4109 | hir@sboh.wa.gov
or go to sboh.wa.gov

Health Impact Review of S-0746.1/17
Prohibiting Assigning Homework in Grades Kindergarten through Three

January 30, 2017

Author: Alexandra Montaña
Contributor/Reviewer: Christy Hoff
Reviewer: Michelle Davis
Reviewer: Kelie Kahler

Contents

Introduction and Methods	1
Analysis of S-0746.1/17 and the Scientific Evidence.....	2
Logic Model.....	3
Summaries of Findings	4
Logic Model- Additional Pathways	7
Discussion of Additional Pathways	8
Annotated References	10

Introduction and Methods

A Health Impact Review is an analysis of how a proposed legislative or budgetary change will likely impact health and health disparities in Washington state ([RCW 43.20.285](#)). For the purpose of this review ‘health disparities’ have been defined as the differences in disease, death, and other adverse health conditions that exist between populations ([RCW 43.20.270](#)). This document provides summaries of the evidence analyzed by State Board of Health staff during the Health Impact Review of draft bill S-0746.1/17.

Staff analyzed the content of S-0746.1/17 and created a logic model depicting possible pathways leading from the provisions of the bill to health outcomes. We consulted with experts and contacted stakeholders with diverse perspectives on the bill. State Board of Health staff can be contacted for more information on which stakeholders were consulted on this review. We conducted objective reviews of the literature for each pathway using databases including PubMed and Google Scholar.

The following pages provide a detailed analysis of the bill including the logic model, summaries of evidence, and annotated references. The logic model is presented both in text and through a flowchart (Figure 1). The logic model includes information on the strength of the evidence for each relationship.

The strength-of-evidence has been defined using the following criteria:

- **Not well researched:** the literature review yielded few if any studies or only yielded studies that were poorly designed or executed or had high risk of bias.
- **A fair amount of evidence:** the literature review yielded several studies supporting the association, but a large body of evidence was not established; or the review yielded a large body of evidence but findings were inconsistent with only a slightly larger percent of the studies supporting the association; or the research did not incorporate the most robust study designs or execution or had a higher than average risk of bias.
- **Strong evidence:** the literature review yielded a large body of evidence on the relationship (a vast majority of which supported the association) but the body of evidence did contain some contradictory findings or studies that did not incorporate the most robust study designs or execution or had a higher than average risk of bias; or there were too few studies to reach the rigor of ‘very strong evidence’; or some combination of these.
- **Very strong evidence:** the literature review yielded a very large body of robust evidence supporting the association with few if any contradictory findings. The evidence indicates that the scientific community largely accepts the existence of the association.

This review was subject to time constraints, which influenced the scope of work for this review. The annotated references are only a representation of the evidence and provide examples of current research. In some cases only a few review articles or meta-analyses are referenced. One article may cite or provide analysis of dozens of other articles. Therefore the number of references included in the bibliography does not necessarily reflect the strength-of-evidence. In addition, some articles provide evidence for more than one research question so they are referenced multiple times.

Analysis of S-0746.1/17 and the Scientific Evidence

Summary of S-0746.1/17

- Prohibits the use of formally assigned homework in kindergarten through third grade.

Health impact of S-0746.1/17

It is unclear if S-0746.1/17 has the potential to improve educational outcomes and decrease educational opportunity gaps among students in kindergarten through third grade. There is very strong evidence to demonstrate associations between educational outcomes and educational attainment, income, health, and health disparities. However, because the potential impact of this bill on educational outcomes is unclear, directionality of downstream impacts cannot be determined.

Pathways to health impacts

The potential pathways leading from the provisions of S-0746.1/17 are depicted in Figure 1. The likely impact of prohibiting homework in kindergarten through third grade on educational outcomes and educational opportunity gaps is not well researched. Relevant literature is discussed in more detail on page 4 of this review.¹⁻⁵ Evidence in the literature shows that very strong associations do exist between educational outcomes, educational attainment, earning potential and income, health, and health disparities.⁶⁻³⁰ These associations are discussed in greater detail on page 8 and are based on the understanding that the direction of the associations will be dependent on whether or not the provisions of S-0746.1/17 have a positive or negative impact on educational outcomes for students in grades K-3.

Scope of this Health Impact Review

This Health Impact Review focuses on the literature that examines associations between homework and educational outcomes for kindergarten through third grade. Although a large body of literature exists on homework and a number of outcomes, we focused our attention on K-3 literature as these are the grades that would be impacted by this bill. We also looked at other potential pathways leading from the provisions of this bill, such as impacts on sleep and time spent on family and leisure-time activities, which are discussed in the other considerations section on pages 5-6.

Magnitude of impact

Title 28A RCW refers to common school provisions and common schools are defined in RCW 28A.150.020 as, "...schools maintained at public expense in each school district and carrying on a program from kindergarten through the twelfth grade or any part thereof including vocational educational courses otherwise permitted by law." Therefore, because this bill would add a new section to chapter 28A.320 RCW, it would apply only to public schools in Washington. Data from the Office of Superintendent of Public Instruction indicates there are 335,165 students enrolled in kindergarten through third grade in public schools in Washington for the 2016-2017 school year.

Logic Model

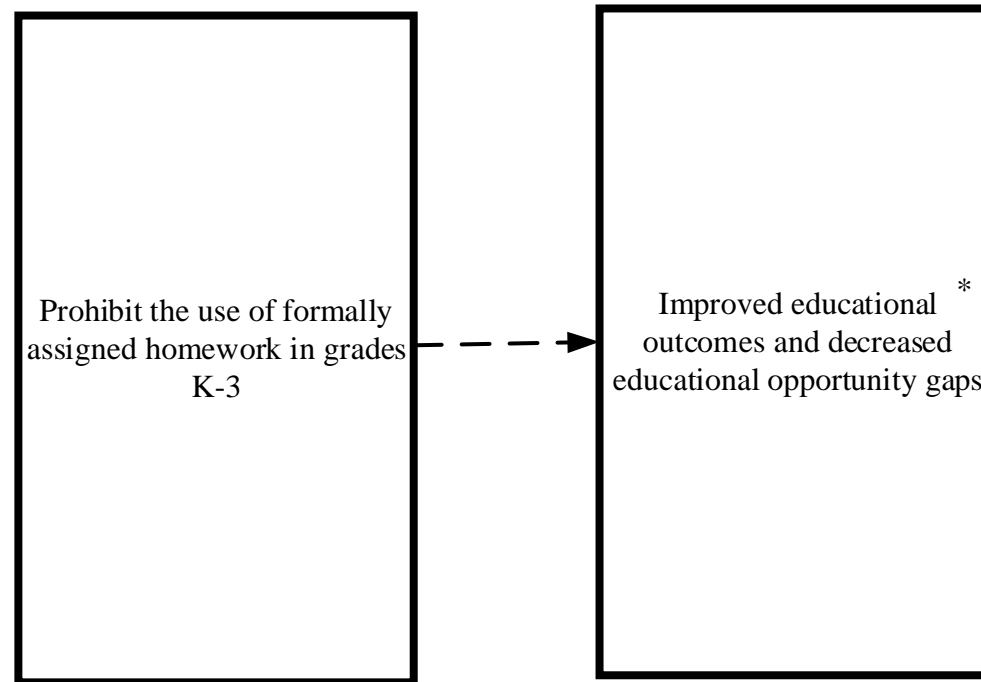
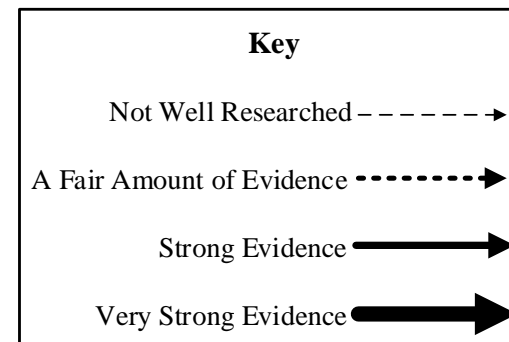


Figure 1
Prohibiting Assigning Homework in Grades
Kindergarten Through Three
S-0746.1/17

*See the full Health Impact Review for discussion about additional pathways leading from educational outcomes



Summaries of Findings

Will prohibiting the use of formally assigned homework in kindergarten through third grade improve educational outcomes and decrease educational opportunity gaps?

It is unclear if S-0746.1/17 has the potential to improve educational outcomes and decrease educational opportunity gaps among students in kindergarten through third grade. There is a large body of literature that examines the impacts of homework on a number of different outcomes, including educational outcomes. However, there is very limited evidence for these outcomes in early elementary, particularly kindergarten through third grade. The small amount of literature that does exist is more than 15 years old, may no longer be generalizable, and the findings are conflicting. There is also a lack of research that looks at the impacts of assigning homework on educational outcomes for different populations, which would provide us with an understanding of the role that homework plays in decreasing educational opportunity gaps. Although eliminating homework in some, or all grades has been a topic of much discussion over the last few years, most of the actions and recommendations have not been supported by scientific evidence.

We identified three studies that found positive associations between assigning homework and improved academic outcomes such as classroom grades in early elementary education. In a 1995 study by Townsend, the author aimed to understand the effects of vocabulary homework on the acquisition of vocabulary knowledge and understanding among two classes of third grade students; one that was assigned homework and one that was not.⁴ Test scores from both classes indicate that the classroom without homework had a mean vocabulary test score of 58.4 while the classroom with homework had a mean score of 69.3. The author concluded that homework in vocabulary increases student understanding of the words and has a significant effect on vocabulary development.⁴ The other two studies by Cooper et al. used a sample of students in grades 2-4 to understand the relationships between attitudes about homework, amount of homework assigned and completed, and student achievement.^{2,3} In both studies, the authors found that among students in grades 2-4, classroom grades were predicted by how much homework a student completed.^{2,3}

We identified one study that found a negative association between homework and academic achievement. In this study of third grade students by Wynn (1996), the author found that the amount of time students spent on homework did not significantly contribute to grades.⁵

In 1989, Cooper conducted a systematic review of over 120 empirical studies to examine the effects of homework and his findings further demonstrate that the evidence in this area is conflicting. Generally, Cooper found evidence in the literature to suggest that homework improves retention and understanding of academic material, improves study skills and attitudes toward school, as well as enhancing nonacademic traits such as organization, self-discipline, and independent problem solving.¹ However, literature also suggested potentially negative effects of homework including loss of interest in academic material, less time for community and leisure activities, parental interference and pressure, potential for cheating on assignments under stress, and increased differences between high and low achievers. In total, Cooper identified 20 studies that compared the academic outcomes of students who were given homework versus those who were not. Of these, 14 studies demonstrated positive effects of homework on achievement and 6

avored no homework.¹ Cooper also noted a strong grade level interaction in that the correlation between amount of homework and achievement was nearly zero for grades 3-5 but stronger among those in grades 5 through 9, and stronger still for those in high school.¹ Given all of this evidence, Cooper still drew the conclusion in a later study that, "... [evidence] supports the assignment of homework in early grades, not necessarily for its immediate effects on achievement but rather for its potential long-term impact. The impact of early-grade homework is mediated, through time, by its facilitation of the development of proper study skills, which, in turn, influence grades."³

Finally, it is important to consider that the relationship between homework and academic performance is further mediated by additional factors such as attitudes about homework and perceptions about the amount of homework assigned. Cooper et al. examined these relationships for students in grades 2-4 and found that student attitudes towards homework were negatively associated with standardized test scores but not with classroom grades, and that student reports of how much teacher-assigned homework they were given were negatively associated with grades.^{2,3} In other words, students who had a negative attitude toward homework were more likely to have lower test scores, but their attitudes did not affect classroom grades, and if students thought their teachers assigned too much homework, this had a negative effect on their grades. Further, positive parent attitudes toward homework predicted the level of parent facilitation in the homework process as well as a student's attitude towards homework.² These complex relationships make understanding the direct path from homework to educational outcomes difficult.

Other considerations

We pursued other research questions in order to determine if there are alternate pathways leading from the provisions in the bill to positive or negative health impacts. We ultimately did not include these pathways in the logic model on page 3 of this review because there was insufficient evidence to determine if the connections exist. We evaluated the evidence concerning 1) the impact of homework on sleep, and 2) impact of homework on family and leisure-time activities.

Impact of homework on sleep

There is a lack of evidence in the literature to demonstrate an association between homework and sleep patterns of students, particularly among grades K-3. One study from China investigated the impact of time spent on homework on the sleep schedules of children aged 5 to 12.³¹ The authors found that homework schedule (i.e. time spent on homework each night) was significantly associated with later bedtime, later wake time, and shorter sleep duration overall. The impact on sleep behaviors was greatest during the weekday than on weekends.³¹ Further, the National Sleep Foundation recommends children between the ages of 5-12 should get 9 to 11 hours of sleep each night. A nationally representative survey found that only 50% of 3rd-6th graders in the United States get the recommended amount of sleep on a school night, although this estimate grows to 80% if you include students who get at least 8 hours of sleep.³² This survey also found that students in the total sample population (grades 3-12) who get enough sleep are less likely than those who do not get enough sleep to be assigned homework everyday.³² While this evidence is suggestive of an association between homework and the amount of sleep students get, not enough research has been conducted to make a definitive conclusion about the relationship.

Impact of homework on family and leisure-time activities

We also examined the relationship between homework and time spent on other activities such as physical activity, leisure-time activities, and time spent with family. Data from a nationally representative survey in the United States that included 1,000 public school teachers of grades K-12, 501 parents of children in grades K-12, and 2,101 students in grades 3-12 provides evidence for how students currently spend their time on weekdays after school. In terms of other activities that occupy at least one hour of time on a school day, homework ranks behind time with family, time with friends, and time spent participating in activities. Among elementary school students, 62% report spending at least three hours a day with family, and 88% spend at least one hour. Additionally, 63% of elementary school students spend one hour or more participating in activities and 55% spend at least one hour with friends. Finally, 63% of elementary students report spending less than an hour on homework each night.³² The National Parent Teacher Association and the National Education Association endorse the “10-minute rule”, which says that the total amount of homework a student should have per night, for all subjects combined, is 10 minutes per grade level. That translates to 10 minutes of homework a night for a student in first grade, 30 minutes for a student in third grade, 60 minutes for a student in sixth grade, and so on. Given that students in elementary are reporting relatively low amounts of homework and higher amounts of time spent with family and participating in activities, it is unclear how the additional time provided by eliminating homework in grades K-3 would be utilized.

Logic Model- Additional Pathways

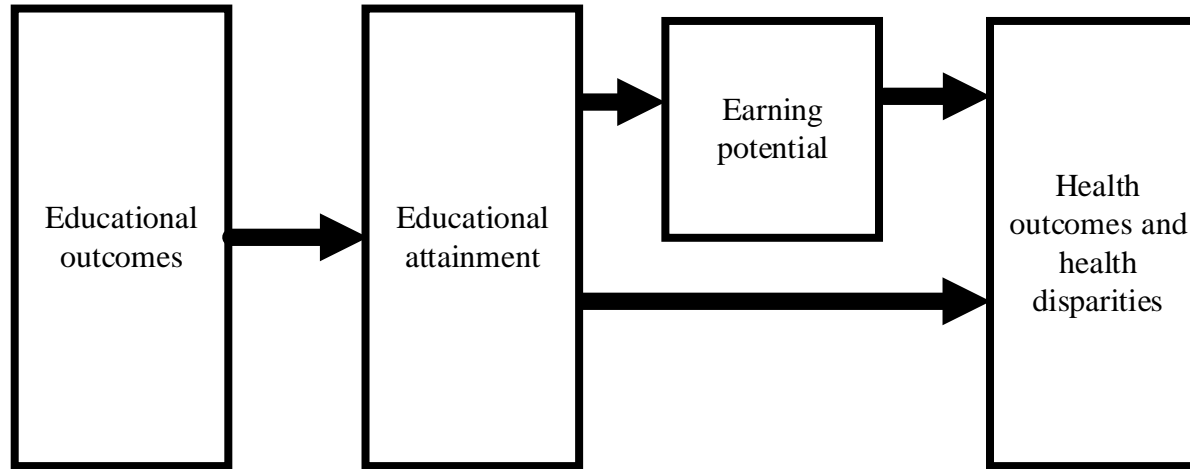
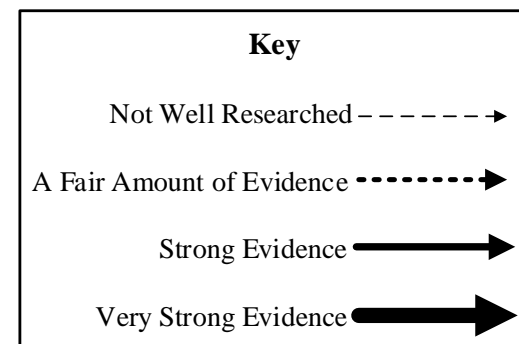


Figure 2
Potential additional pathways leading from educational outcomes to health and health disparities



Discussion of Additional Pathways

Overview

For this Health Impact Review, we examined the most direct pathway leading from the provisions of S-0746.1/17 to health and health disparities, which is through educational outcomes. Because there was a lack of evidence to support an association and the directionality of the association could not be determined (i.e. a positive impact or a negative impact), we were unable to conclude what the impacts would be further down the logic model. What we do know from evidence in the literature is that very strong associations do exist between educational outcomes, educational attainment, earning potential and income, health, and health disparities.⁶⁻³⁰ The following sections outline the evidence from the literature for each of these associations. The direction of the associations will be dependent on whether or not the provisions of S-0746.1/17 have a positive or negative impact on educational outcomes for students in grades K-3. In other words, if future research demonstrates that assigning homework in grades K-3 has a positive impact on educational outcomes, then existing evidence would further support positive impacts on educational attainment, earning potential, income, health and health disparities. Conversely, if future research demonstrates that assigning homework in grades K-3 has a negative impact on educational outcomes, then existing evidence would further support negative impacts on these outcomes.

Educational outcomes and educational attainment

There is very strong evidence that educational outcomes such as classroom grades and student's readiness to learn are associated with educational attainment.^{13,16,19,30} For example, one study found that low grades during primary school were predictive of not having completed a secondary education by age 20 or 21.³⁰ In addition several measures of educational outcomes are innately indicative of education attainment (e.g. specific grades are required as a prerequisite for high school graduation—one measure of educational attainment) further supporting the strength-of-evidence for this relationship.

Educational attainment and earning potential

There is very strong evidence for the connections between educational attainment and income as well as rates of unemployment. National data from 2015 indicate that as educational attainment increases median weekly earnings also increase and unemployment rates decrease.⁸ These links are well documented globally, and data indicate that these trends do exist in Washington state as well.^{7,8}

Earning potential, health outcomes, and health disparities

There is very strong evidence that relationships exist between earning potential, health outcomes, and health disparities. There is a large body of robust evidence that supports the association between income, or socioeconomic position, and health.^{6,7,9,10,12,20-24,26,28,29} Significant correlations exist between income and a number of health indicators including overall self-reported health, depression, stress, asthma, arthritis, stroke, oral health, tobacco use, women's health indicators, health screening rates, physical activity, and diabetes.^{7,9,10,23,28} Further, 2015 data indicate that age-adjusted death rates were higher in Washington census tracts with higher poverty rates.²¹ Household income was also the strongest predictor of self-reported health status in Washington in 2016, even after accounting for age, education, and race/ethnicity.²⁴ Among children, evidence indicates that socioeconomic status in the first five years of life is associated

with health outcomes in later childhood and adolescence including activity-limiting illness, parent-reported health status, acute and recurrent infections, body mass index (BMI), dental caries, and rates of hospitalization.²⁶ Finally, financial stress is also associated with adverse outcomes for families such as problem behavior in adolescents, interparental conflict, and parental depression.²²

Educational attainment, health outcomes, and health disparities

There is very strong evidence that educational attainment is associated with health. Data collected nationally and in Washington state indicate a correlation between educational attainment and health outcomes such as rates of diabetes, oral health problems, tobacco use, inactivity, obesity, depression, and coronary heart disease. The correlation between health and education is observed even after controlling for income, which can also serve as a mediating factor.^{6,7,9,11,12,14,15,17,18,21,24,25,27}

Annotated References

1. **Cooper Harris. Synthesis of Research on Homework. *Educational Leadership*. 1989.**

In this article, Cooper highlights the findings from his 1989 systematic review on the effects of homework, which included over 120 studies. Generally, Cooper found evidence in the literature to suggest that homework improves retention and understanding of academic material, improves study skills and attitudes toward school, as well as enhancing nonacademic traits such as organization, self-discipline, and independent problem solving. However, literature also suggested potentially negative effects of homework including loss of interest in academic material, less time for community and leisure activities, parental interference and pressure, potential for cheating on assignments under stress, and increased differences between high and low achievers. In total, Cooper found 14 studies that demonstrated positive effects of homework on achievement and 6 that favored no homework. Cooper also noted a strong grade level interaction in that the correlation between amount of homework and achievement was nearly zero for grades 3-5 but stronger among those in grades 5 through 9, and stronger still for those in high school. Cooper concludes that for students in elementary, the effect of homework on achievement is trivial if anything. Cooper goes on to provide policy recommendations and says that elementary school students, "...should be given homework, even though it should not be expected to improve test scores. Instead, homework for young children should help them develop good study habits, foster positive attitudes toward school, and communicate to students that learning takes place at home as well as school."

2. **Cooper Harris, Jackson Kristina, Nye Barbara, et al. A model of homework's influence on the performance evaluation of elementary school students. *The Journal of Experimental Education*. 2001;69(2):181-199.**

In this analysis, Cooper et al. utilized structural equation modeling (SEM) to test the influence of homework on classroom performance among elementary school children. The authors describe that SEM is, "...similar to multivariate regression in its ability to examine relationships after accounting for relationships with other variables. Moreover, SEM allows for the simultaneous estimation of direct and indirect effects and also provides overall fit indices for the model." To be included in the study, the authors needed a complete data set from the teacher (grades 2-4), at least 1 student in that teacher's class, and data from 1 of that student's parents or guardians. In total, the authors analyzed data from 214 independent data units (with 1 unit being a student and their parent/guardian). The sample was drawn from three school districts including a large metropolitan public school district, a suburban school district, and a rural school district. The authors used a variety of tools for data collection such as a homework process inventory survey, Tennessee Comprehensive Assessment Program (TCAP) scores, parent reports, and classroom grades. All data collection took place in 1995. The most relevant finding from the author's model was that classroom grades were predicted by how much homework a student completed but were unrelated to a student's attitude towards homework. Further, positive parent attitudes toward homework also predicted the level of parent facilitation in the homework process as well as a student's attitude towards homework.

3. **Cooper Harris, Lindsay James J., Nye Barbara, et al. Relationships among attitudes about homework, amount of homework assigned and completed, and student achievement. *Journal of Educational Psychology*. 1998;90(1):70-83.**

Cooper et al. aimed to understand the relationships between attitudes about homework, amount of homework assigned and completed, and student achievement among kids in lower grades (grades 2-4) and those in upper grades (grades 6-12). In total, the authors collected data from 709 "triads", meaning they had data from one teacher, at least one student in that teacher's class, and one parent of that student. In addition to test scores from the Tennessee Comprehensive Assessment Program (TCAP) and teacher assigned grades, the authors used a questionnaire called the Homework Process Inventory (HPI) to collect data about a number of aspects of homework practices and procedures. Focusing on the results for just the lower grades, the authors found that student reports of how much teacher-assigned homework they were given was negatively associated with grades. Next, there was a significant positive relationship between parent attitudes about homework and student attitudes, and student attitudes were negatively related to TCAP scores. Finally, the authors found that students' grades were positively associated with the amount of homework they completed. In conclusion, Cooper et al. describe how, "...we suggest that the present study supports the assignment of homework in early grades, not necessarily for its immediate effects on achievement but rather for its potential long-term impact. The impact of early-grade homework is mediated, through time, by its facilitation of the development of proper study skills, which, in turn, influence grades."

4. **Townsend Stacy. *The Effects of Vocabulary Homework on Third Grade Achievement*, Kean College of New Jersey; 1995.**

Townsend aimed to understand the effects of vocabulary homework on the acquisition of vocabulary knowledge and understanding among third grade students. The author utilized two classrooms of third grade students, a total of 40 students, who were all between 8 and 9 years of age. Both classrooms were taught the same vocabulary lesson and only one classroom was assigned homework that included finding definitions in the dictionary, illustrating vocabulary words, yes or no questions about the words, and a synonym worksheet. After 3 weeks of lessons, the students were given a vocabulary test and the scores of the two classrooms were compared. The author found that the classroom without homework had a mean score of 58.4 (standard deviation of 16.49) while the classroom with homework had a mean score of 69.3 (standard deviation of 14.02). The author concluded that homework in vocabulary increases student understanding of the words and has a significant effect on vocabulary development.

5. **Wynn Janet. *The Effects of Family Involvement, Homework, and TV Time on Student Grade Point Average: Education*, Auburn University; 1996.**

In this dissertation, Wynn presents an overview of the literature as well as the findings of a study that aimed to examine the effects of family involvement, homework, and TV time on the GPA of third grade students. The author included a total of 170 third grade students from 15 different classes in five elementary schools in the southeast United States. Wynn used a number of instruments to collect information including school files for demographic data, report card data to calculate student's grade point average, a family involvement survey, and scores from a Cognitive Abilities Test. The first finding of interest was that the amount of time students spent on homework did not significantly contribute to grades. Next, there was a significant association

between family involvement in students' social and academic lives and higher grades. Further, there was an association between families who were more involved with their children and more time spent on homework.

6. ***Health of Washington State: Mental Health. Washington State Department of Health;2008.***

Washington Behavioral Risk Factor Surveillance System (BRFSS) data from 2004-2006 indicate that American Indians and Alaska Natives and non-Hispanic black individuals reported significantly higher rates of poor mental health compared to other groups. These relationships persisted after adjusting for additional factors such as age, income, and education. Washington BRFSS data also show an association between lower annual household income and poor mental health, a relationship that was also shown with education. It is well understood that mental health is also closely related to other areas such as employment opportunities, physical health, substance abuse. This report also highlights a Washington state study from 2002 that reveal that 16% of individuals in the state who were receiving publicly funded mental health services had at least one felony conviction, a rate over twice that of the general population.

7. ***Centers for Disease Control and Prevention. Behavioral Risk Factor Surveillance System Prevalence And Trends Data: Washington-2014. 2014;***
<http://apps.nccd.cdc.gov/brfss/page.asp?cat=XX&yr=2014&state=WA#XX>. Accessed August 16, 2016.

Behavioral Risk Factor Surveillance System (BRFSS) 2014 data from Washington state show significant correlations between lower income and a number of health indicators including: worse overall self-reported health, depression, asthma, arthritis, stroke, oral health, tobacco use, women's health indicators, health screening rates, physical activity, and diabetes. Data also show that as educational attainment increases income level also increases.

8. ***Bureau of Labor Statistics website. Employment projections: Earnings and unemployment rates by educational attainment. Last Updated March 15, 2016;***
http://www.bls.gov/emp/ep_chart_001.htm. Accessed November 1, 2016.

National data from 2015 indicate that as educational attainment increases median weekly earnings also increase and unemployment rates decrease.

9. ***Christensen Trevor, Weisser Justin. Health of Washington State Report: Tobacco Use. Washington State Department of Health;2015.***

Christensen et al. report Washington state Behavioral Risk Factor Surveillance System (BRFSS) data from 2012 to 2014 indicate that prevalence of smoking decreases as income and levels of education increase. Further, American Indians and Alaska Natives (AI/AN) and Native Hawaiian/Other Pacific Islander populations have significantly higher smoking rates than white, black, Hispanic, and Asian populations.

10. ***Ellings Amy. Health of Washington State Report: Obesity and Overweight. Washington State Department of Health;2015.***

Ellings reports Washington state Behavioral Risk Factor Surveillance System (BRFSS) data from 2002-2014, which shows that obesity rates are the highest among low income families and that as income increases, rates of obesity decrease. Further, individuals that graduated college or attended some college had lower rates of obesity than those who had a high school education or less. Black, American Indian and Alaska Native, and Hispanic Washington residents had higher rates of obesity even after accounting for gender, income, education, and age.

11. Kandel Denise B., Griesler Pamela C., Schaffran Christine. Educational attainment and smoking among women: Risk factors and consequences for offspring. *Drug and Alcohol Dependence*. 2009;104:S24-S33.

Researchers examined United States data from four national data sets and found that, among women, lower levels of education are associated with greater risk of being a current smoker, smoking daily, smoking heavily, being nicotine dependent, starting to smoke at an early age, having higher levels of circulating cotinine (a metabolite of nicotine) per cigarettes smoked, and continuing to smoke in pregnancy. In addition, lower levels of maternal education were linked to increased risk of antisocial behavior among offspring.

12. Kemple Angela. *Health of Washington State Report: Diabetes*. Washington State Department of Health;2016.

Kemple presents data from Washington regarding diabetes in the state. Washington data from the Behavioral Risk Factor Surveillance System (BRFSS) from 2012-2014 show that among adults, the percentage of persons with diabetes increased as household income decreased. This relationship was also true for education. Further, BRFSS data also show that age-adjusted diabetes prevalence is highest among those who are Hispanic, American Indian/Alaska Native, and black.

13. Lucio R, Hunt E, M Bornovalova. Identifying the necessary and sufficient number of risk factors for predicting academic failure. *Developmental Psychology*. 2012;48(2):422-428.

Lucio et al. analyzed data from the Educational Longitudinal Study: 2002 which includes a national sample of 14,796 students. The authors used a 5-step process to identify which factors contribute to academic ‘failure’—a grade point average (GPA) of less than 2.0 which is the minimum GPA needed to graduate from high school. They found that a number of academic outcomes impact a student’s GPA and therefore their ability to attain a high school diploma. Many of these are academic outcomes that other research has found to be impacted by skipping breakfast such as academic engagement, grade retention, and behavior among students. The authors also found that the odds of passing decreased with each additional risk factor: “For each risk factor that is added, there is a 47% increased likelihood of failing.”

14. McCarty C. A., Mason W. A., Kosterman R., et al. Adolescent school failure predicts later depression among girls. *The Journal of adolescent health : official publication of the Society for Adolescent Medicine*. Aug 2008;43(2):180-187.

McCarty et al. conducted a prospective longitudinal cohort study with a sample of 808 youth followed from ages 10 to 21. The researchers discovered that adolescent school ‘failure’

(meaning being suspended, expelled, or dropping out of high school early) predisposed girls to depression in early adulthood.

15. McLaren L. Socioeconomic status and obesity. *Epidemiologic Reviews*. 2007;29:29-48.

McLaren et al. conducted a meta-analysis exploring the relationship between obesity and SES among adults. A total of 333 studies published internationally met the inclusion criteria. In highly developed countries, the majority of the studies found higher body weights among women with lower education attainment. Nearly 50% of the studies in highly developed countries found the same relationship for men.

16. Melby J. N., Conger R. D., Fang S. A., et al. Adolescent family experiences and educational attainment during early adulthood. *Developmental psychology*. Nov 2008;44(6):1519-1536.

Melby et al. analyzed data from a longitudinal study of two-biological-parent intact families in Iowa. They had a sample size of 451 families. The researchers conducted modeling to determine what factors impact educational attainment and found level of academic engagement was strongly correlated with later educational attainment.

17. Mersky JP, AJ Reynolds. Educational success and adult health: Findings from the Chicago longitudinal study. *Prevention Science*. 2009;10(2):175-195.

Mersky and Reynolds analyzed data from a Chicago prospective cohort study that followed 1,539 individuals. Results indicate that high school completion was significantly and inversely associated with tobacco smoking, frequent substance use, depression, and no health insurance coverage. In addition, middle school reading performance was inversely related to depression and student's expectation to attend college was negatively associated with frequent drug use.

18. Mezuk B, Eaton WW, Golden SH, et al. The influence of educational attainment on depression and risk of type 2 diabetes. *American Journal of Public Health*. 2011;98(8):1480.

Researchers analyzed adult survey data collected in the Baltimore Epidemiological Catchment Area and then conducted follow-up interviews with the survey cohort. Mezuk et al. found a statistically significant association between type 2 diabetes and lower educational attainment. In addition, the data indicate that depression was associated with type 2 diabetes, but each year of education attained decreased the risk of type 2 diabetes for those experiencing depression.

19. Ou Suh-Ruu, Reynolds Arthur J. Predictors of educational attainment in the Chicago Longitudinal Study. *School Psychology Quarterly*. 2008;23(2):199-229.

Ou and Reynolds analyzed data from the Chicago Longitudinal Study, using a sample size of 1,286 youth in order to investigate predictors of high school completion and total educational attainment. They found that, among other factors, school absences, grade retention, and youth's educational expectations all influenced educational attainment.

20. **Paul Karsten I., Moser Klaus. Unemployment impairs mental health: Meta-analyses. *Journal of Vocational Behavior*. 2009;74(3):264-282.**

Paul et al. conducted a meta-analysis of 237 cross-sectional and 87 longitudinal studies that examined the relationship between mental health and unemployment. The meta-analysis of cross-sectional data revealed that unemployed persons showed significantly more symptoms of distress and impaired well-being than did employed persons. The meta-analyses of longitudinal studies and natural experiments supported the concept that unemployment is not only correlated to distress but also causes it.

21. **Poel A. *Health of Washington State Report: Mortality and Life Expectancy. Data Update 2015*. Washington State Department of Health;2015.**

Poel presents Washington state data on mortality and life expectancy. The data show that age-adjusted death rates were higher in Washington census tracts with higher poverty rates. The state data also show that American Indian/Alaska Natives, Native Hawaiian/Other Pacific Islanders, and black residents had the highest age-adjusted death rate and shortest life expectancy at birth compared to other groups in the state.

22. **Ponnet K. Financial stress, parent functioning and adolescent problem behavior: an actor-partner interdependence approach to family stress processes in low-, middle-, and high-income families. *Journal of youth and adolescence*. Oct 2014;43(10):1752-1769.**

Ponnet cites extensive evidence on the relationship between financial hardship and emotional problems among youth and adults, family conflict, problem behavior among adolescents, and psychological distress. The author analyzed data from a subsample of two-parent families with children between 11 and 17 years of age from the Relationship between Mothers, Fathers and Children study drawn from the Dutch-speaking part of Belgium (n= 1,596 individuals from 798 families). Analysis showed that parents in low-income groups had significantly more financial stress than those in middle-income and high-income groups. The author found that the association between financial stress and problem behavior in adolescents is mediated by depressive symptoms, interparental conflict, and positive parenting. They also found that financial stress had more detrimental impacts on depressive feelings for mothers with low incomes than for those with higher incomes.

23. **Prause J., Dooley D., Huh J. Income volatility and psychological depression. *American journal of community psychology*. Mar 2009;43(1-2):57-70.**

Prause et al. analyzed a sample (n = 4,493) from the National Longitudinal Survey of Youth. Researchers found that income volatility was significantly associated with depression; and downward volatility (frequent losses in income) was significantly associated with depression even after controlling for baseline depression. High income appeared to act as a buffer, so those with lower incomes were more vulnerable to the adverse effects of downward volatility.

24. **Serafin M. *Health of Washington State Report: Self-reported Health Status. Data Update 2016*. Washington State Department of Health;2016.**

Serafin presents data from Washington state on self-reported health status. The data show that after accounting for age, education, race and ethnicity, household income was a strong predictor

of self-reported health status. Health status varied by race and ethnicity, with close to 35% of Hispanics, 30% of American Indian/Alaska Natives, and 20% of Native Hawaiian/Other Pacific Islanders reporting fair or poor health. Washington Behavioral Risk Factor Surveillance System (BRFSS) data from 2012-2014 also show that education was a strong predictor of self-reported fair or poor health after adjusting for age.

25. Skodova Z., Nagyova I., van Dijk J. P., et al. Socioeconomic differences in psychosocial factors contributing to coronary heart disease: a review. *Journal of clinical psychology in medical settings*. Sep 2008;15(3):204-213.

Skodova et al. conducted a meta-analysis of the literature addressing the relationships between SES, coronary heart disease (CHD), and psychosocial factors contributing to coronary heart disease. Researchers identified 12 studies that met their inclusion criteria. They found that higher levels of education are associated with lower rates of CHD, and that decreasing education is associated with factors that are linked to CHD such as depression, anxiety, hostility, and a lack of social supports.

26. Spencer N., Thanh T. M., Louise S. Low income/socio-economic status in early childhood and physical health in later childhood/adolescence: a systematic review. *Maternal and child health journal*. Apr 2013;17(3):424-431.

Spencer et al. conducted a meta-analysis of studies examining the relationship between low socioeconomic status in the first five years of life and physical health outcomes in later childhood and adolescence. Nine studies met the researchers' strict inclusion criteria. The studies indicated significant associations between early childhood low-income status and a number of adverse health outcomes including: activity-limiting illness, parent-reported poor health status, acute and recurrent infections, increasing body mass index (BMI), dental caries, and higher rates of hospitalization.

27. Steptoe A., Hamer M., Butcher L., et al. Educational attainment but not measures of current socioeconomic circumstances are associated with leukocyte telomere length in healthy older men and women. *Brain, behavior, and immunity*. Oct 2011;25(7):1292-1298.

Steptoe et al. analyzed data collected from 543 male and female London-based civil servants of white European origin. All participants were between the ages of 53 and 76 and healthy. Researchers looked at blood samples to determine telomere length and telomerase activity. Telomere shortening is associated with aging. Short telomeres are also associated with increased risk of premature heart attack and mortality. Researchers found that lower educational attainment was associated with shorter telomere length after controlling for biological and behavioral covariates. This association remained significant even after adjusting for current SES. Researchers speculated that low educational attainment may be an indicator of long-term lower SES, and may be associated with accumulated stress resulting in telomere shortening. They also postulate that education may promote problem-solving skills leading to reduced responses to stress, thereby impacting aging.

28. **Subramanyam M., Kawachi I., Berkman L., et al. Relative deprivation in income and self-rated health in the United States. *Social science & medicine*. Aug 2009;69(3):327-334.**

Subramanyam et al. analyzed data from the 2002, 2004, and 2006 Current Population Surveys conducted by the United States Census Bureau. Researchers found that individuals from the lowest income category were over five times more likely to report being in poor health than participants from the highest income category. In addition, they found that relative deprivation (the differences in incomes between an individual and others who have higher incomes than that individual [one measure of income inequality]) appeared to explain a large part of this association.

29. **VanEenwyk J. *Health of Washington State Report: Socioeconomic Position in Washington*. Washington State Department of Health;2014.**

VanEenwyk presents data about socioeconomic position in Washington State including differences within the state as well as statewide differences compared to national data. Data indicate that compared to the United States as a whole, fewer Washington residents are living in poverty and a higher percentage of residents ages 25 and older have college degrees. However, these economic resources are not evenly distributed among all Washington residents. Females in Washington were more likely to be living in poverty than males and were also more likely to have lower wages. Further, American Indian and Alaska Native, Hispanic, and black residents had higher percentages of living in poverty and lower median household incomes compared to other groups. Data also indicated that counties in eastern Washington were more likely to have high poverty rates and high rates of unemployment than counties in western Washington.

30. **Winding T. N., Nohr E. A., Labriola M., et al. Personal predictors of educational attainment after compulsory school: influence of measures of vulnerability, health, and school performance. *Scandinavian journal of public health*. Feb 2013;41(1):92-101.**

Winding et al. analyzed data from a 2004 questionnaire completed by a cohort of adolescents born in 1989 (n=3053) in Denmark (83% response rate) and linked 2010 educational attainment data from Statistics Denmark. This allowed for a follow-up of 6.5 years. The authors found that low grades during primary school was predictive of not having completed a secondary education by age 20/21 (odds ratios between 1.7 and 2.5). For students with low math grades this association was even stronger. The authors cite two additional studies which have also found an association between school performance and later educational attainment.

31. **Li S., Yang Q., Chen Z., et al. Homework schedule: an important factor associated with shorter sleep duration among Chinese school-aged children. *Behavioral sleep medicine*. Sep 03 2014;12(5):389-397.**

Li et al. utilized a large sample of primary school-aged children to investigate the hypothesis that homework schedules can impact children's sleep habits. The sample included 19,299 children from eight cities in China, with a mean age of 9 years old (range = 5.08-11.99 years). Parent-administered questionnaires were used to collect data about homework schedules, sleep variables, and control variables such as gender, age, grade, extracurricular activities, household income, etc. The authors found that homework schedule (i.e. time spent on homework each

night) was significantly associated with later bedtime, later wake time, and shorter sleep duration overall. The impact on sleep behaviors was greatest during the weekday than on weekends. The authors conclude with a recommendation that homework schedules should be restrained in order to benefit children's sleep behaviors.

32. ***The MetLife Survey of The American Teacher: The Homework Experience- A Survey of Students, Teachers, and Parents. New York, New York: MetLife, Inc.;2007.***

This report aimed to examine the views and experiences of teachers, students, and parents regarding, "...the quantity of homework assigned and completed, how and when homework is accomplished, the impact of homework, perceived goals and value of homework, the level of student engagement in learning, and the amount of time teachers spend on homework." The study included a nationally representative sample of 1,000 public school teachers of grades K-12, 501 parents of children in grades K-12, and 2,101 students in grades 3-12. Findings indicate that over 80% of parents and teachers believe that doing homework is important or very important and that it helps students learn more in school. 60% of parents think that their children are assigned the right amount of homework and another 25% think that too little homework is assigned. The authors also found that Black and Hispanic parents are more likely than white parents to believe that homework is important, that homework helps students learn, and that doing homework will help their child a lot in reaching their goals after high school. Similarly, Black students are the most likely to believe that doing homework is important. In terms of other activities that occupy at least one hour of time on a school day, homework ranks behind time with family, time with friends, and time spent participating in activities. 62% of elementary school students report spending at least three hours a day with family, and 88% spend at least one hour. 63% of elementary school students spend one hour or more participating in activities and 55% spend at least one hour with friends. Further, 63% of elementary students report spending less than an hour on homework each night. The National Sleep Foundation recommends children between the ages of 5-12 should get 9 to 11 hours of sleep each night. This survey found that only 50% of 3rd-6th graders are getting the recommended amount of sleep on a school night. Students in the total sample population who get enough sleep are less likely than those who do not get enough sleep to be assigned homework everyday. 84% of elementary students agree that they have enough time to do all of their homework each day.