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LIST OF TERMS AND ABBREVIATIONS

ANOVA	Analysis of Variance
B/L	Lowell, MA and Brockton, MA
BLS	Bureau of Labor Statistics
CI	Confidence Interval
DHHS	Department of Health and Human Service
FTE	Full Time Equivalent
L/O/P	Los Angeles, CA, Oakland, CA and Philadelphia, PA
NIOSH	National Institute for Occupational Safety and Health
OHL	Occupational Health Literacy
OSH	Occupational Safety and Health
PR	Prevalence Ratio
SD	Standard Deviation
SES	Socioeconomic Status
WRI	Work-related Injury

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Final Report Abstract:

Building on the concept of "health literacy" as defined by the US Department of Health and Human Services, we developed an analogous measure specific to workplace safety, "occupational health literacy" (OHL). OHL, as we have defined it, is "the degree to which individuals have the capacity to obtain, process, and understand basic occupational safety and health (OSH) information and services (i.e., safety training) needed to be safe at work." As general health literacy is important to good health and safety training can be protective against work injury, particularly among young and inexperienced workers, we suggest that OHL, which embodies much more than the acquisition of safety training, can affect one's capacity to stay safe at work. In this exploratory study, we achieved the following three objectives: 1) to assess adolescent OHL; 2) to determine whether OHL is associated with adolescent work-related injury (WRI) risk and 3) to examine whether OHL is associated with adolescents' socioeconomic status (SES).

We achieved these objectives using a unique dataset containing survey information on 2,262 adolescent workers in five cities across the US (Oakland, CA; Los Angeles, CA; Brockton, MA; and Philadelphia, PA). These data included variables on work injury, SES, and an array of variables used to measure OHL and is components (e.g., "access to OSH information and training" and "OSH knowledge and awareness"). Descriptive analyses were conducted along with regression modeling. The high prevalence of WRI in this sample precluded the use of logistic regression, thus, to test the association between OHL and injury, Cox regression models were used to obtain prevalence ratios.

Findings revealed that adolescents possess a moderate level of OHL with a mean overall OHL score of 14.5 (S.D.=3.1). Among the OHL sub-components, the mean score for the level of OSH information and training was low at 2.8 (S.D.=1.9) while the score for OSH knowledge and awareness was moderate at 11.5 (S.D.=2.2). We also found that OHL is positively associated with WRI prevalence. This association appears to be largely driven by the OHL subscale on receipt of safety training, which likely represents job hazardousness and may be overwhelming any protective effect of OHL on work injury in these analyses. Lastly, adjusted results showed no association between SES (measured as subjects' mother's education) and OHL nor between SES and any of the OHL components. However, teens who work to financially support their family (and are of lower SES) had statistically higher overall OHL scores and scores on the information and training subscales.

Despite the negative findings of this exploratory study, we believe there remains a theoretical basis for the concept of "occupational health literacy" and for its potential to protect young workers from injury. We believe that the mainly null findings are more likely due to the limitations of this dataset and the difficulties in examining the potential value of OHL for protecting adolescent workers from work injury than a truly absent association between OHL and WRI among youth. This work has shown that more precise measurement of OHL and variables that may potentially confound its relationship to work injury is crucial to understanding the relationship between OHL and work injury. Much work needs to be done to fully understand the complexities of the OHL concept and how it operates as a potential protective factor for young worker injury.

SIGNIFICANT (KEY) FINDINGS

Below are the most important results of this study organized by study aim. These and other findings are elaborated on in our Scientific Report.

AIM 1: To assess adolescent occupational health literacy (OHL) along the following dimensions: A) access to health and safety information; and B) health and safety knowledge and skills

Respondents' showed a moderate level of OHL with a mean overall OHL score of 14.5 (S.D.=3.1) and a range of3 to 23 (maximum range was 27). Among the OHL sub-components, the mean score for obtainment of OSH information and training was low at 2.8 (S.D.=1.9) and ranged from 0 to 11 (maximum was 12) while the score for OSH knowledge and awareness was moderate at 11.5 (S.D.=2.2) with a range of 1 to 15 (max 15). Overall OHL was significantly associated with all demographic characteristics. Among the component scores, OSH information and training was significantly associated with all demographic characteristics except for SES and OSH knowledge and awareness was associated with all characteristics except race/ethnicity.

AIM 2: To determine whether occupational health literacy is associated with adolescents' work-related injury(WRI) risk

Adjusted regression modeling revealed a *positive* association between the overall OHL score and work-related injury prevalence (PR=1.03, 95% CI [1.02, 1.05]. This unexpected association appears to be driven by the OSH information and training subcomponent of OHL as it was positively associated with injury prevalence while the OHS knowledge and awareness subcomponent was not (OSH information and training PR=1.05, 95% CI [1.02, 1.09], OSH knowledge and awareness PR=1.01, 95% CI [0.98, 1.05]). Looking further at the sub scales that make up the OSH information and training component we found that both the information and safety training subscales were also positively associated with injury prevalence (information PR=1.06, 95% CI [1.00, 1.09], safety training PR=1.05, 95% CI [1.01, 1.10]. More detailed examination of the subscales that make up the OSH knowledge and awareness component showed that neither the knowledge nor the awareness subscale was positively associated with injury prevalence (knowledge PR=1.00, 95% CI [0.97, 1.04], awareness PR=1.04, 95% CI [0.98, 1.10]). When all four of these subscales were modeled, only the safety training subscale remained positively associated with injury prevalence while controlling for the remaining subscales and the confounder variables. Crude results revealed a nearly identical pattern as that observed in the adjusted models. It should be noted that the N for crude models were much higher (between 1780 and 1933) as they did not suffer the compounded effect of missing data for several variables. The similarity in the crude and adjusted models suggests that the adjusted results are not likely artifacts of this loss of observations.

AIM 3: To determine whether occupational health literacy is associated with adolescents' socioeconomic status (SES)

Adjusted results showed no association between SES (measured as subjects' mother's education) and OHL nor between SES and any of the OHL subscales. A nearly significant positive association was observed between the awareness subscale and SES with almost all the increase coming in the highest education level (graduate training) (p=0.07). However, a variable that indicates that working to support one's family was identified as among the subjects' reasons for employment was statistically associated with higher overall OHL score, as well as higher scores for the information and training subscales. Stratified results by school groupings showed no effect of SES, measured with mother's education, on any of the overall OHL score or any of its components. However, working to support one's family and OHL scores did, again, positively and significantly predict higher overall OHL scores and higher information and training subscale scores in the Brockton/Lowell strata. In the Los Angeles/Oakland/Philadelphia group, these scores were all higher among those working to support their families (indicating lower SES), but only training approached statistical significance (p=0.06), perhaps reflecting lesser statistical power in this strata. Both the knowledge and the awareness subscales were not significantly associated with working to support one' family in either strata.

TRANSLATION OF FINDINGS

We believe these findings cannot yet be applied to the workplace. We do have advice from lessons learned for future investigative studies and as we believe this overlaps with the OUTCOMES/IMPACT section, we present

our suggestions for future research on adolescent occupational health literacy in that section below.

OUTCOMES/ IMPACT

Potential Outcomes

The unexpected findings of this exploratory study have lead us develop some cautions regarding future investigations into the subject of adolescent occupational health literacy. There have been valuable lessons learned from this work which can potentially impact not only our future work on OHL and adolescent work injury but the work of other researchers who may wish to build on this nascent research area.

Among these lessons learned, two stand out for us. The first is that the effect of SES on teens' information regarding work is multifaceted. That is, different kinds of information may come from different places in society and that these clusters of information, though all may be associated with SES, may work in opposite directions. It seems some aspects of what might be included in occupational health literacy, such as training, may come from the workplace itself – which is related to SES, while others, such as what we referred to as awareness, may come from factors based in the home, such as perhaps attitudes of parents – which is also associated with SES. While either element of information may or may not be related to risk of workplace injury for teen workers, studying the effects of OHL and its links to SES should consider that adding up bits of information may occur via different mechanisms built into socioeconomic status. These sources may add up independently or interact to produce individual subjects' measures of occupational health literacy. Despite acknowledging a variety of sources of information, it had not occurred to us prior to doing this research that the accumulation of occupational health literacy might work in counteractive ways (e.g., that some forms of information, training, knowledge and awareness may be higher due to low SES and other forms due to higher SES). We will take this lesson with us into future efforts to investigate socioeconomic status and health disparities broadly and with regard to the potential value and differential allocation of information in particular.

A second important lesson we wish to point out to others conducting similar research is the need to consider that hazardous work itself may be the driving force behind the accumulation of knowledge, training and perspectives on occupational health, both academic and applied. Simple experience may lead to accumulated knowledge, the ability to apply it (if only by trial and error) and the development of relations with others on the job who may be sources of information. Also, the very need for such knowledge and information may come from the hazardousness of the job one is performing. This, we now suspect, goes well beyond the association between job training that should do with dangerous employment. In conjunction with this association between dangerous work and a variety of components we measured as OHL, it also did not occur to us that teens would have such a variety of exposures that could be so difficult to control for. We did not anticipate the difficulty of a population based approach to studying OHL among teens sampled from high schools. We suggest that future studies of the potential protective value of OHL examine teens working in a very narrow range of jobs so that work exposures may be relatively homogenous in the sample. Even in such a design, it may be necessary to acquire job task exposure data so that differences may be accounted for in the statistical analyses.

Intermediate Outcomes:

There are no intermediate outcomes to report at this time.

End Outcomes:

There are no end outcomes to report at this time.

SCIENTIFIC REPORT

Background

Adolescent Occupational Injuries - Working outside the home for pay is common among US teenagers [7]. In 2006, 2.4 million 16- and 17-year-olds had formal employment [8]. While work is largely a positive experience for youth it is not devoid of risks. Work-related injuries are the fourth most common type of unintentional injury among those ages 10-19 [9]. The National Institute for Occupational Safety and Health (NIOSH) estimates the number of non-fatal work-related injuries among those under age 18 to be between 168,000 [10] and 230,000 [5]. In 2003, an estimated 54,800 work-related injuries and illnesses among youth less than 18 years of age were treated in hospital emergency departments [11]. U.S. Bureau of Labor Statistics data for 2001 show that 44,535 16-19- year-olds sustained an occupational injury or illness involving days away from work in that year alone [11]. The most common types of non-fatal injuries sustained by youth are lacerations, sprains and strains, contusions and burns [12]. Most non-fatal injuries occur in the retail and service industries [11, 13, 14], which employ the greatest number of youth under 18 [12, 13]. Injury rates are highest in the retail industry [15] yet construction and manufacturing also have high rates of adolescent injury compared to other industries

Social Disparities in Injury Risk - The literature on adolescent WRI provides a good understanding of the injury experiences of working youth as a whole [15-18] yet our understanding of the experiences of particular groups of workers is much more limited. Though it is documented that, among adolescents, males, older workers, blacks, and Hispanics are more likely to be injured [12, 19-21], little is known about how injury experiences differ between youth of different socioeconomic backgrounds. Given the extensive evidence of risk differentials by SES for many other types of unintentional injuries among youth [22-27] one would expect that such associations would reveal themselves within occupational injuries as well yet few studies have explored this question. Much of the reason for this is that data on SES are often not collected by the major surveillance systems that monitor occupational injuries, nor are they typically collected in surveys of young workers themselves. A study by Rauscher and Myers (2008) explored this question using survey data on young workers. Results showed that youth of low SES are more likely to be injured at work than youth from more affluent backgrounds [28]. A statistically significant inverse association between adolescents' SES (measured using mother's education) and prevalence of WRI was found in a sample of 1,430 working high school students, after controlling for hours worked per week, work history duration, and race. Although similar results have been found in the adult worker population [29-31], the complex pathways through which SES influences occupational injury are yet to be fully understood in either population.

Health Literacy and Health - Improving health literacy is an objective of the U.S. DHHS's Healthy People 2010 Initiative [1]. It is defined as "the degree to which individuals have the capacity to obtain, process and understand basic health information and services needed to make appropriate health decisions" [32]. Among the US public, health literacy is very low. According to the 2003 National Assessment of Adult Literacy, 17% of American adults have less than adequate skills and another 22% possess only basic health literacy skills [33]. This low level of health literacy has become a serious concern [1, 34] given the impacts it has on American's health and the health care system. Reviews of the literature on the relationship between low health literacy and health show that low health literacy is associated with failure to obtain preventive health services, delayed presentation for treatment and diagnosis, and a greater likelihood of being hospitalized and using expensive medical care [35-45]. It is also associated with a number of problematic health behaviors such as poor medication management and errors, failure to comply with treatments and manage one's own care effectively, and poorer chronic disease management [35, 37, 44, 46]. Most importantly it is associated with increased mortality, increased incidence of chronic illness, poorer intermediate disease markers, and poorer general health status [36, 37, 40, 42,43]. Most of what is known about health literacy and its effect on health comes from research on adults. Very little is known about adolescent health literacy [35, 47, 48] yet some studies have shown that substance use, smoking, alcohol misuse, and body mass index are all associated with low health literacy in adolescents [44].

SES, Health and Health Literacy - It is well established that those of low SES have poorer health [49]. The gap in health status between individuals of different SES levels in the US has persisted over time despite advances that have helped to equalize the intervening mechanisms to good health (e.g., improved sanitation,

immunizations) between the more and less affluent [50, 51]. It is argued by sociologists, that longstanding health inequalities are the result of the persistent unequal distribution of protective resources. They posit that SES largely determines one's access to the kinds of resources (e.g., money, power, prestige, social support, knowledge) that are needed to protect oneself against known health risks and thus, individuals of higher SES are better positioned to know about health risks and to have the ability to take protective measures than are individuals of low SES [50, 52, 53]. This is borne out by the epidemiologic literature on SES, health literacy, and health status.Individuals of low SES have lower levels of [33, 44] general literacy. They also have less access to the types of protective information, knowledge and services that contribute to good health [54-58]. For example, two studies found that knowledge of cardiovascular risk factors was lower among low SES individuals [55, 56]. Others found that knowledge of the Pap-test among women of low SES was lower than among higher SES women [54] and that pregnant women of low SES are less likely to be offered screening for Down Syndrome [59]. Lastly, individuals of low SES also have lower levels of health literacy [33, 44, 60,61]. The low health literacy of disadvantaged populations has been shown to contribute to health disparities [42, 46,62].

Occupational Health Literacy - No research has looked at health literacy as it applies to the work setting and worker health and safety. In this study, we adapted the definition of health literacy, referred to above, to the work setting and defined the concept of "*occupational health literacy"* as "having the capacity to obtain, process, and understand basic *workplace health and safety information*, and services needed to make appropriate decisions *with regard to staying safe and avoiding work-related injuries and illnesses."* Recognizing hazards, understanding and following safety procedures, and knowing the child labor laws and one's rights as a worker are elements we consider to embody*occupational health literacy* as it applies to adolescent workers. As a novel concept, occupational health literacy has never been measured in the young worker population so it is unknown exactly how literate youth are when it comes to matters of occupational health. Determining this was a major goal of this study.

SES and Occupational Health Literacy - Drawing on the research linking SES and *general* health literacy [33, 44, 60, 61], we hypothesized that similar relationships exist between SES and *occupational* health literacy within the young worker population. We posit that just as individuals of low SES are likely to have lower health literacy, so too are they likely to have lower occupational health literacy because they lack the kinds of health protective resources they need to stay safe at work. A look at the channels through which health information is imparted to youth illustrates the potential for SES differentials in occupational health literacy among youth. Because most youth lack employer provided health and safety training, they must rely on other sources of information on work safety.Parents, teachers, civic groups, the internet, etc. are all important health communication channels and contributors to adolescents' development of health literacy [63, 64]. These are also channels through which health and safety information can be transmitted. Having access to these communication channels is not only useful for filling in the gaps in employer provided training, but receiving information from *multiple* sources can help solidify young workers' health and safety knowledge and skills. In the Healthy People 2010 Initiative report it is noted that, "health communication best supports health promotion when multiple communication channels are used…" [32]. Access to these channels and the quality of information they provide is likely differ by SES. Access to health and safety information through the schools is likely to be differential by students' SES as schools in communities of higher wealth are more likely to have the resources needed to educate their students on health and safety than are those in less affluent communities [65]. Likewise access to information through the internet is liable to be differential by SES as low-income youth are less likely to have computer access [64, 66]. Also, low SES parents, who possess lower health literacy and lack their own access to health protective knowledge are less able to impart health protective knowledge to their low SES children than are more affluent parents [44, 67]. We do not know, however, the number of channels through which health and safety information is provided to young workers, and if in fact, low SES youth have access to fewer of them, which we see as a contributor to low occupational health literacy.

Occupational Health Literacy, WRI and SES - The literature on WRI tells us that in some circumstances having health and safety training is protective against injury[68-71] and that receipt of training among young and inexperienced workers is of particular value as most injuries at work occur within the first year on the job, with the highest injury rates occurring among workers ages 16-17 [72]. It is therefore likely that occupational health literacy, which encompasses much more than simply possessing safety training, can affect one's capacity to stay safe at work.

Specific Aims

The specific aims of this study were as follows:

AIM 1: To assess adolescent occupational health literacy along the following dimensions: A) access to health and safety information; and B) health and safety knowledge and skills

AIM 2: To determine whether occupational health literacy is associated with adolescents' work-related injury (WRI) risk

AIM 3: To determine whether occupational health literacy is associated with adolescents' socioeconomic status (SES)

AIM 4: To determine whether low occupational health literacy among low SES adolescents is a mediating factor between low SES and elevated WRI prevalence

Methodology

Data Source

This study analyzed two unique pre-existing cross-sectional surveys conducted in 1999 from students across five public high schools in the US. The first includes data originally collected as part of the consortium project "Protecting Young Workers," funded through a Cooperative Agreement between the University of North Carolina Injury Prevention Research Center and the National Institute for Occupational Safety and Health (NIOSH). These data were collected in one high school in each of the following cities: Oakland, CA; Los Angeles, CA; Brockton, MA; and Philadelphia, PA. The second dataset comes from a survey conducted by school administrators in one high school in Lowell, MA. The purpose of both original studies was to learn about the working conditions and work-related injury experiences of youth. These data acquired via questionnaires include variables on work-related injury prevalence, demographics, and work experiences as well as items on receipt of health and safety information, training and knowledgeof safety concepts, which we used to construct ameasure of "occupational health literacy."

Data Collection

Data from participants at all five schools were collected using the same self-administered, anonymous questionnaire, which was developed by researchers at the University of North Carolina, Chapel Hill. The instrument had been pilot tested and used in a statewide survey of working teens in North Carolina in 1995[73] and a 1996 NC survey of workers in the retail industry [74, 75]. In the Brockton high school, a purposive sample of grade 10 through 12 classrooms was selected for the survey. In the Oakland and Los Angeles schools, students in a randomly selected sample of required English classes in grades 9 through 12 were surveyed. In the Philadelphia school, students in grades 9 through 12 were surveyed in their homeroom classes. In these four consortium sites, all students completed one of three self-selected surveys based on their work experience (currently working, previously worked but not currently working, never worked) [76]. In the Lowell high school, all students in grades 9 through 11 who were currently working or who had previously worked were asked to participate in the survey, which was administered in all homeroom classes (seniors did not participate as their classes had ended before the survey was conducted)[77].In all surveys, workwas defined as "a paid job for someone outside the home, excluding baby-sitting or odd jobs."Further details on data collection in the consortium study can be found in Delp, et. al., 2002 [78] and Runyan, et.al., 2003 [79] and details on the Lowell study can be found in Rauscher and Myers 2008 [77].

Sample

Because the focus of this work is on adolescent workers' OHL, we omitted from the database any respondents over the age of 18 and under the age of 14 and included only students with current or prior work experience in our analyses. This resulted in a final sample of 2,262 participants acrosstheschools in the five cities as follows: Oakland, n=177; Los Angeles, n=169; Brockton, n=282; Philadelphia, n=204, and Lowell, n=1430. US Census data for 2000 show the median household income in the five cities where data were gathered ranged from $30,746 - $40,055. Although there is substantial variance by location, median household income for each of the five cities was below the national median of $41,994.

Variables & Measures

As mentioned above, we distinguish between two components of OHL, which parallel the components of health literacy defined by the DHHS. They are the capacity to: 1) obtain *occupational safety and health* information and services (i.e, safety training); and 2) process and understand *occupational safety and health* information. The available survey data allowed us to construct proxies for each of these two OHL components as described below.

OSH Information and Training: The first component was labeled "OSH Information and Training" and was operationalized as the extent to which respondents obtained OSH information from sources outside the workplace such as a teacher, a parent or friend, and the extent to which they received health and safety services, in the form of employer provided safety training. To measure this component we used responses from two survey items. The first item asked respondents' to name all the sources from which they have ever received information about how to keep from getting hurt at work. Response options included, teachers, school nurses, school counselors, parents, friends, the media, other. We summed the number of sources named to create an "information" subscale with a range of 0 to 7. The other survey item asked respondents whether they had ever received employer provided safety training on any of the following five topics: how to do their job; why and how to use safety equipment; how to keep their workplace clean; their rights as workers; and what to do if they notice something dangerous on the job. We summed the number of affirmative responses to create a "safety training" subscale with a range of 0 to 12. Finally, these two subscales were combined to create a total score (range 0-12) measuring OHL component 1: the extent to which respondents had obtained OSH information and training.

OSH Knowledge and Awareness:The second component was labeled "OSH Knowledge and Awareness" and was operationalized as one's demonstrated awareness and knowledge of select child labor laws and key workplace health and safety concepts. To measure this component we first summed the number of correct answers to 10 questions about the child labor laws such as whether 16- and 17-year-olds are allowed to drive a car to deliver food, and created a subscale for "knowledge" with a range of 0-10. We then summed the number of affirmative responses (agree vs. disagree) to the following 5 statements about workplace safety: "work accidents don't 'just happen,'" "teen workers' injuries are preventable,""teen jobs are not necessarily all safe,""teen workers should have safety training," and "teens can make a difference in job safety" and made a subscale for "awareness" with a range of 0-5. These two subscales were combined to create a total score (range 0-15) measuring OHL component 2: the extent of respondents OSH knowledge and awareness.

Overall OHL: Lastly, the two component scores were summed to create a final score measuring respondents overall OHL (range of 0-27).

Work-related Injury:We measured injury using responses to a single survey item. Respondents were asked, "While working for someone outside your household, have you ever had any of the following injuries?" and instructed to check all applicable responses from the following list of outcomes: "a back injury," "any other muscle injury," "a burn," "a cut," "a broken bone," "an electric shock," or "any other injury." No additional instruction was given; respondents determined whether they had experienced at least one event. A dichotomous measure of ever having had one or more of these injuries, regardless of type or severity, versus having none was created and used in all analyses.

SES: To measure socioeconomic status (SES), we used mother's education [82-85]. Since teenagers' SES is a function of their parents', measures of parental SES are recommended for studies of SES and children's health [82, 83]. Maternal education has some advantages over other measures of SES: it is rarely missing in surveys of youth, is more accurately reported by youth than family or household income, and is highly correlated with father's education [82, 83]. We also used a secondary SES measure, whether respondents worked to help financially support their families. An indicator variable was created based on subjects' responses regarding the reasons why they decided to take their job.

Other Variables: In addition to age and gender, self-reported race/ethnicity was also collected. Race/ethnicity was derived from responses to two survey items pertaining to race and ethnicity. We coded these responses into one of five of the following categories: Asian (non-Hispanic), Black/African American (non-Hispanic), Hispanic, White (non-Hispanic), and "Other (non-Hispanic)." The last group includes Native Americans and those who checked off more than one response option.

To account for time at risk in our injury models, we created a "work history duration" variableby subtracting the age at which respondents first worked in a formal job from their age at time of survey completion. This variable represents a maximum possible duration of employment since any period of unemployment between jobs was not measured.

We also created a "job hazardousness" measure to account for varying risk by respondent job type. We used respondents' current or most recent job. Respondents were asked to select one answer from a list of sixteen occupations (e.g., cashier, cook, waitress, construction worker). Respondents were given the option to select "other" and write in their occupation. Using the 1990[1] US Census occupation codes, we coded responses into one of 13 "minor occupational groups"(e.g., "Administrative Support," "Mechanics and Repairers")[81]. We then assigned each respondent their minor occupational grouping's 1999 BLS age-specific injury rate per 10,000 workers (either ages 14-15 or ages 16-19, as categorized by the BLS)[80]. For example, a 15-year-old working as a sales clerk was assigned the 1999 injury rate for 14- to 15-year-olds in the minor group, "Sales Occupations."

Statistical Analyses

AIM 1: To assess adolescent occupational health literacy along the following dimensions: A) access to health and safety information; and B) health and safety knowledge and skills

To achieveAim 1 descriptive analyses were conducted with all OHL scores for the entire sample and then by each demographic characteristic. To test for bivariate associations between demographic variables and OHL (and its two subcomponents) two-tailed t-tests with equal variance were used to test for significant differences in scores between genders and one-way ANOVA was used with race and city; to test all other associations we used linear regression. OHL and its component scores were modeled as continuous measures.

AIM 2: To determine whether occupational health literacy is associated with adolescents' WRI risk

Because the prevalence of work-related injury is high (41%) in this dataset, logistic regression was not appropriate for modeling the association between OHL and injury outcomes; odds ratios approximate relative risk when outcome measures are rare. When the outcome is not rare (>10%) ordinary logistic regression would produce inflated odds ratios [86]. Thus, to model associations with the injury outcome, Cox regression was used in a manner described by Barros to obtain prevalence ratios [87]. Using this approach, the "time to failure" variable was set arbitrarily to one (although any constant can be used) for all observations. The injury indicator variable serves as the "failure" variable. This model obtains prevalence ratios since it calculates model parameters by looking to the first "failure" event which, in this design, is the instant in which all events occur. Regression models of injury outcomes included the work history duration variable to account for the maximum time at risk that teens may have worked. Injury incidence rates provided by the US BLS were included to adjust for job hazardousness.Since exploratory analysis conducted using spline regression techniques revealed a nonlinear association between job hazardousness and injury prevalence, the job hazardousness variable was modeled as a set of indicator variables group according to natural breaks in the distribution. Gender, age, race and SES were also included to adjust results. Finally, robust standard errors were used, as recommend by Barros [87], and cluster adjustments by school were applied to account for the correlation of observations.

We also conducted stratified analysis by school location. Regression models were stratified to explore differences in associations by schools in the sample. Since the data were too sparse to examine the schools separately, regression models were stratified by combining the schools in Lowell and Brockton, MA(B/L), and contrasting this grouping with the schools in, Los Angeles, Oakland and Philadelphia (L/O/P) combined. Since respondents in the Lowell, MA school made up the majority (57%) of the observations included in the final model, stratification was also done to examine this schools' influence on the full model. It was observed, however, that the coefficients of the Lowell only model (not shown) were not changed when Lowell was grouped with Brockton; therefore Lowell and Brockton were combined. These groupings are not intended to

[1]Because our job hazardous measure is based on 1999 Bureau of Labor Statistics injury rates, which use the 1990 census occupation codes, we used the same coding scheme as the Bureau. 80. United States Bureau of Labor Statistics, *Injuries, Illnesses, and Fatalities*, 1999, US Department of Labor. Available at: http://www.bls.gov/iif/home.htm: Washington, D.C..

reflect regional differences, but rather they meant to encapsulate much of the racial and ethnic variation in the schools as Brockton and Lowell were primarily white and the others were mostly Hispanic (Los Angeles) and black (Oakland and Philadelphia). Examination of model coefficients provided empirical support for these groupings; differences, where observed, were strongest using these groupings.

AIM 3: To determine whether occupational health literacy is associated with adolescents' SES

To achieveAim 3 we used linear regression to test for associations between scores of overall OHL and each of its sub-scores and socioeconomic status. SES was measured via two variables (also as described earlier but summarized here). First, mother's education level was used. This was done by creating a dichotomous variable, distinguishing those with a college degree (or higher) vs. those who had not completing college and a four-level variable indicating highest degree earned (less than high school, high school/some college, college graduate and graduate degree). Those in the less than high school category were omitted from models and served as the reference category. The second variable used to represent SES was a dichotomous variable that indicates whether the teen included working to financially support their family among their reasons for their employment. A positive response is taken as a measure of *low* SES as it suggests economic need not present in those who did not indicate this purpose for working. Linear regression was used to model crude associations between these SES variables and to determine results adjusted for age, gender, employment history duration, race and school location. To explore interaction effects between the SES and OHL association by race and ethnicity, models were also stratified by the school location groupings as described above. These groupings were also used to determine whether the numeric majority of the sample contributed by Lowell was driving results of our full models. In addition, these groups demonstrated dramatic differences in the effects of SES (as measured by mother's highest degree earned) on work related injury. Therefore, to examine the association between SES and OHL scores, we again applied this stratification scheme.

AIM 4: To determine whether low occupational health literacy among low SES adolescents is a mediating factor between low SES and elevated WRI prevalence

Due to our findings relative to the prior aims (as described in detail below), we were unable to conduct the proposed analysis for Aim 4. The following describes our original proposed methods for achieving this aim. We will compared changes in the magnitude of the SES coefficients after including measures of occupational health literacy.This is conceptually different but mechanically similar to analysis of confounding [97]. Since occupational health literacy is theorized to be on the causal pathway between SES and WRI, any decrease in the effect of SES on WRI with occupational health literacy in the model will represent the extent to which occupational literacy mediates the role of SES on WRI risk. Coefficients for SES are expected to weaken in the presence of occupational health literacy measures. The overall model building approach employed in this study will be a theoretically guided forward selection process. That is, after determining bi-variate associations, models will start with the outcome (occupational health literacy scores or WRI) and the main variable of interest (occupational literacy scores or SES); other variables observed to be significantly associated with the outcome will be added to the model to determine the impact of each on the bi-variate association.

Results & Discussion

AIMS 1 & 2 - In this section, we provide some basic descriptive data first and then present the results for Aim 1 and the related Aim 2. We follow this with a discussion of the Aim 1 and 2 findings.

Results

Sample Characteristics **-** The characteristics of the sample are presented in Table 1 below. The majority of the sample is between the ages of 15 and 17 and females outnumbered males in all school samples except Philadelphia. There are a variety of races and ethnicities represented and SES also varies considerably yet a large proportion of respondents have mothers with a high school diploma or some college. Race and SES vary dramatically across schools (chi-square $p < 0.001$ for associations between school and race, and school and SES). The average work-history duration was just over two years; over three-quarters(76.8%) of respondents worked in either sales- or service-related occupations. As for job hazardousness, the age-specific injury rate ranged from 0 to 150.7 per 10,000 FTE and had a mean of45.3 (S.D.=42.8).

Injury Prevalence **-** Forty one percent of respondents reported being injured at work at least once. Among those reporting at least one injury, 38.6% self-reported they experienced more than one kind ofinjury.

Table 1. Sample Characteristics, by School Location

	Percent					
	All Cities (n=2262)	**Brockton, MA (n=282)**	**Los Angeles, CA (n=169)**	**Lowell, MA (n=1430)**	**Oakland, CA (n=177)**	**Philadelphia, PA (n=204)**
Age						
n	*1974*	*257*	*146*	*1236*	*162*	*173*
14	6.2	1.9	5.5	7.6	0.0	9.3
15	25.5	13.7	22.6	29.9	19.4	20.8
16	32.3	31.2	26.0	33.8	28.5	32.4
17	26.2	36.5	29.5	23.5	26.7	26.6
18	9.8	16.7	16.4	5.3	24.5	11.0
Gender						
n	*2026*	*257*	*153*	*1260*	*170*	*186*
Female	53.0	53.7	50.3	53.3	63.5	41.9
Male	47.0	46.6	49.7	46.7	35.8	58.1
Race/Ethnicity						
n	*1928*	*245*	*140*	*1205*	*160*	*178*
White	38.6	57.1	0.0	49.7	1.9	1.7
Black/African American	18.5	26.9	10.0	2.4	63.8	82.0
Asian	25.6	4.1	0.7	37.8	15.6	1.1
Hispanic (all races)	14.8	10.6	87.9	8.1	10.0	12.4
Other race	2.4	1.2	1.4	1.9	8.8	2.8
Mother's Education						
n	*1471*	*210*	*89*	*872*	*142*	*158*
<HS Diploma	18.5	12.6	66.3	18.8	11.7	3.8
HS Diploma/ Some College	47.4	50.5	27.0	43.9	48.3	73.4
College Graduate	24.0	28.0	5.6	24.8	30.3	18.4
Graduate Education	10.2	8.9	1.1	12.5	9.7	4.4
			Mean			
Work History Duration*	2.1	1.9	2.3	2.0	2.3	2.5
n	*1755*	*255*	*142*	*1025*	*160*	*173*
Job Hazardousness+	45.3	47.4	48.5	44.3	44.0	46.3
n	*1427*	*216*	*117*	*828*	*114*	*152*

*in years
+1999 work injury rate/10,000 workers between the ages of 14 and 19.

AIM 1: To assess adolescent occupational health literacy along the following dimensions: A) access to health and safety information; and B) health and safety knowledge and skills

Respondents' showed a moderate level of OHL with a mean overallOHL score of 14.5 (S.D.=3.1) and a range of3 to 23 (Table 2 below). Among the OHL sub-components, the mean score for obtainment of OSH information and training was low at 2.8 (S.D.=1.9) and ranged from 0 to 11 while the score for OSH knowledge

and awareness was moderate at 11.5 (S.D.=2.2) with a range of 1 to 15. Differences in OHL scores by demographic characteristics are displayed in Table 2. Overall OHL was significantly associated with all demographic characteristics.OSH information and training was significantly associated with all demographic characteristics except for SES.OSH knowledge and awareness was associated with all characteristics except race/ethnicity.

Table 2. Occupational Health Literacy (OHL) Scores, by Demographic Characteristics

Characteristic	Mean Overall OHL Score (range 0-27)	Mean OHL Subcomponent Scores	
		OSH Information &Training[a](range 0-12)	**OSH Knowledge &Awareness**[b](range 0-15)
Total Sample	14.37	2.82	11.54
n	*1782*	*1933*	*1848*
Age			
n	*1729*	*1824*	*1782*
14-15	13.51***	2.45***	11.04***
16	14.48	2.82	11.57
17	15.12	3.05	12.00
18	15.44	3.24	12.00
Gender			
n	*1765*	*1871*	*1822*
Female	14.90***	2.90*	11.92***
Male	13.97	2.73	11.14
Race/Ethnicity			
n	*1710*	*1808*	*1762*
White	14.11***	2.55***	11.46
Black/African American	15.10	3.20	11.73
Asian	14.44	2.78	11.63
Hispanic (all races)	14.71	3.04	11.55
Other race	14.11	2.64	11.32
Mother's Education			
n	*1326*	*1400*	*1361*
<HS Diploma	14.87**	3.00	11.80**
HS Diploma/Some College	14.70	2.88	11.71
College Graduate	14.48	2.83	11.60
Graduate Education	14.05	2.66	11.17
School			
n	*1781*	*1932*	*1847*
Brockton, MA	15.38***	3.10***	12.04***
Lowell, MA	14.02	2.55	11.42
Los Angeles, CA	14.41	2.91	11.46
Oakland, CA	15.37	3.43	11.88
Philadelphia, PA	15.02	3.48	11.37

[a]Occupational health and safety information and training obtained by respondents

[b] Respondents' knowledge and awareness of occupational health and safety information and concepts

Significance levels: *p<0.05, **p<0.01,***p<0.001

AIM 2: To determine whether occupational health literacy is associated with adolescents' WRI risk

Table 3 shows the prevalence ratios and 95% CIs for OHL scores and injury prevalence**.** All results were adjusted for age, race, gender, SES, employment history duration, school, and job hazardousness and all were generated using robust standard error estimators. Adjusted regression modeling revealed a positive association between the overallOHL score and work-related injury prevalence (PR = 1.03, 95% CI [1.01, 1.05]) (Model 1.). This association appears to be driven by the OSH information and training subcomponent as it was positively associated with injury prevalence while the OHS knowledge and awareness subcomponent was not (OSH information and training PR = 1.05, 95% CI [1.02, 1.09], OSH knowledge and awareness PR = 1.01, 95% CI [0.98, 1.05]) (Model 2). Looking further at thesubscalesthat make up the OSH information and training subcomponent(Model 3) we found that both the information and safety training subscales werealso positively associated with injury prevalence (information PR = 1.06, 95% CI [1.00, 1.12], safety training PR = 1.05, 95% CI [1.01, 1.10]. More detailed examination of thesubscalesthat make up the OSHknowledge and awarenesssubcomponent(Model 4) showed that neither the knowledgenor the awarenesssubscales were positively associated with injury prevalence (knowledge PR = 1.00, 95% CI [0.97, 1.04], awareness PR = 1.04, 95% CI [0.98, 1.10]). When all fourof these subscales were modeled, only the safety training subscale remained positively associated with injury prevalence while controlling for the remaining subscales and the confounder variables (Model 5).Crude results (not shown) revealed a nearly identical pattern as that observed in the adjusted models. The only difference regarding significance of associations is that in Model 3 (containing the information and safety training subscales) the information subscalewas not significantly associated with injury prevalence. The coefficient for the safety training subscale was substantially reduced from about 1.11 in the crude model to 1.05 in the fully adjusted model, and the coefficient for the OHS information and training subcomponent was reduced from 1.08 in the crude model to 1.05 in the fully adjusted model. It is also must be noted that the N for crude models were much higher (between 1780 and 1933) as they did not suffer the compounded effect of missing data for several variables. The similarity in the crude and adjusted models suggests that the adjusted results are not likely artifacts of this loss of observations.

Table 3. Adjusted* Prevalence Ratios and 95% CIs for Occupational Health Literacy (OHL) Scores and Injury Prevalence

Scores	Model 1 (n=939)	Model 2 (n=939)	Model 3 (n=982)	Model 4 (n=950)	Model 5 (n=939)
Overall OHL	1.03 (1.01, 1.05)	--	--	--	--
OSH Information & Training[a]		1.05 (1.02, 1.09)	--	--	--
Information			1.06 (1.00, 1.12)	--	1.05 (0.99, 1.12)
Safety training			1.05 (1.01, 1.10)	--	1.05 (1.00, 1.09)
OSH Knowledge & Awareness[b]		1.01 (0.98, 1.05)	--	--	--
Knowledge				1.00 (0.97, 1.04)	1.01 (0.97, 1.04)
Awareness				1.04 (0.98, 1.10)	1.03 (0.97, 1.09)

*all models adjusted for age, gender, race, employment history duration, school location, and job hazardousness
[a]Occupational health and safety information and training obtained by respondents
[b] Respondents' knowledge and awareness of occupational health and safety information and concepts

Stratified Models-Regression models were stratified to explore differences in associations by schools in the sample (Table 4 below). Since the data were too sparse to examine the schoolsseparately, regression models were stratified by combining the schools in Lowell and Brockton, MA(B/L),and contrasting this grouping with the schools in, Los Angeles,Oakland and Philadelphia (L/O/P) combined. Since respondents in the Lowell, MAschoolmade up the majority (57%) of the observations included in the final model, stratification was also done to examine this schools' influence on the full model. However, it was observed that the coefficients of the

Table 4. Adjusted* Prevalence Ratios and 95% CIs for Occupational Health Literacy (OHL) Scores and Injury Prevalence, Stratified by School Groupings**

	Model 1		Model 2		Model 3		Model 4		Model 5	
Scores	**B/L (n=699)**	**L/O/P (n=241)**	**B/L (699)**	**L/O/P (n=241)**	**B/L (n=724)**	**L/O/P (n-258)**	**B/L (n=706)**	**L/O/P (n=244)**	**B/L (n=699)**	**L/O/P (n=240)**
Overall OHL	1.03 (1.01, 1.05)	1.04 (0.98, 1.09)								
OSH Information &Training[a]			1.05 (1.02, 1.09)	1.06 (0.98, 1.14)						
Information					1.05 (0.98, 1.12)	1.09 (0.96, 1.23)			1.05 (0.98, 1.12)	1.09 (0.95, 1.24)
Safety training					1.06 (1.02, 1.11)	1.03 (0.93, 1.13)			1.05 (1.01, 1.10)	1.03 (0.93, 1.15)
OSH Knowledge &Awareness[b]			1.01 (0.98, 1.04)	1.02 (0.93, 1.10)						
Knowledge							1.00 (0.96, 1.04)	0.99 (0.90, 1.09)	1.00 (0.97, 1.04)	1.00 (0.93, 1.10)
Awareness							1.03 (0.97, 1.09)	1.05 (0.91, 1.22)	1.02 (0.96, 1.08)	1.05 (0.89, 1.23)

*all models adjusted for age, gender, race, employment history duration, school location, and job hazardousness
**Groupings: B/L = Brockton/Lowell; L/O/P = Los Angeles, Oakland & Philadelphia
[a]Occupational health and safety information and training obtained by respondents
[b] Respondents' knowledge and awareness of occupational health and safety information and concepts

Lowell only model (not shown) were not changed when Lowell was grouped with Brockton; therefore Lowell and Brockton were combined. This grouping is not intended to reflect regional differences, but rather it encapsulates much of the racial and ethnic variation in the schools as Brockton and Lowell were primarily white and the others were mostly Hispanic (Los Angeles) and black (Oakland and Philadelphia). Examination of model coefficients provided empirical support for these groupings; differences, where observed, were strongest using these groupings. The overall OHL score showed a significant association with injury prevalence in the B/L grouping (PR = 1.03, 95% CI [1.01, 1.05]) and a similar but non-significant association in the L/O/P grouping (PR = 1.04, 95% CI [0.98, 1.09]) (Model 1).

Looking at the two OHL subcomponents (Model 2), the OSH information and training subcomponent showed a significant association with injury prevalence in the B/L grouping (PR = 1.05, 95% CI [1.02, 1.09]) and, again, a similar but non-significant association in the L/O/P grouping (PR = 1.06, 95% CI [0.98, 1.14]). The OSH knowledge and awareness subcomponent showed no significant association with injury prevalence in either the B/L grouping (PR = 1.01, 95% CI [0.98, 1.04]) or the L/O/P grouping (PR = 1.02, 95% CI [0.93, 1.10]) (Model 2).Looking deeper into the subscales that make up the OHS information and training subcomponent (Model 3), we found that the subscale for information was positive but non-significant for B/L (information PR = 1.05, 95% CI [0.98, 1.12]) and L/O/P (information PR = 1.09, 95% CI [0.96, 1.23]). The safety training subscale, however, was positive and significantly associated with injury prevalence for B/L (safety training PR= 1.06, 95% CI [01.02, 1.11]) but not significant for L/O/P (safety training PR 1.03, 95% CI [0.93, 1.13]). Model 4, which looks at the subscales that make up the OSH knowledge and awareness subcomponent, shows that both the knowledge and awareness subscale were both not significantly associated with injury prevalence in either the B/L grouping (knowledge PR = 1.00, 95% CI [0.96, 1.04], awareness PR = 1.03, 95% CI [0.97, 1.09]) or the L/O/P grouping (knowledge PR = 0.99, 95% CI [0.90, 1.09], awareness PR = 1.05, 95% CI [0.91, 1.22]). Finally, Model 5 which contains all four subscales shows that only the safety training subscale remains significant and only for the B/L grouping (safety training PR 1.05, 95% CI [1.01, 1.10]). However, the pattern of coefficients between groupings is quite similar (Table 4).

Discussion

Young workers in this sample showed moderate levels of occupational health literacy with high levels of OSH knowledge and awareness and low levels of OSH training and information. Occupational health literacy, however, was not found to be protective against work injury among youth, as we hypothesized; rather it was positively associated with work-injury. This unexpected association appears to be driven mostly by our measure of safety training received and, to a lesser extent, the level of OSH information received by respondents. The positive association found between receipt of safety training and work injury may suggest that where jobs are more dangerous teen workers are more likely to receive safety training from their employers. That is, we suspect job hazardousness is driving the safety training-work injury relationship and obfuscating that between OHL and work injury.

Our attempt to control for job hazardousness using the BLS injury statistics did not impact the association between safety training and work injury.In addition, no direct association between safety training and job hazardousness as recorded by the BLS could be detected in these data (data not shown). This suggests that the groupings of jobs by BLS category are not sufficient for controlling for job hazardousness, at least with regard to teen workers. When a variety of jobs is included in a sample, as was the case in this school based survey, the hazards of the workplace must be measured very precisely to be able to sufficiently control for them and determine the effects of OHL broadly, and safety training in particular. Future work on the subject of occupational health literacy and its effect on work injury may best be conducted using a limited number of job types for which hazards can be more precisely enumerated and measured. OHL studies that do not adequately account for job hazardousness are likely to mask the potential protective effect of OHL on work injury.

It is also important to point out that because this was a cross-sectional study we could not ascertain whether work injury or various components of OHL came first. The null associations observed here could partly be the result of injured teens seeking out and acquiring information after being injured. While it was reasonable to suspect that teens would be trained before being injured at work, particularly in dangerous jobs, several issues arose that make this issue more complex. Teens change jobs rather frequently (National Institute of Medicine, 1998; United States Department of Labor, 2000; Weller, Cooper, Basen-Engquist, Kelder, & Tortolero, 2003) and it is possible that some may have reported on safety training or OSH information obtained during jobs they

worked after they were injured. It is also possible, though we think less likely, that injured teens received information after being injured, *because* they were injured. However, we speculate that an association between the amount of OSH information received and injury prevalence may be the most susceptible to this possible reverse association. This association was positive and significant in Model 3 and nearly so in the fully adjusted Model 5 and it may be because injured teens seek or are simply provided information after being hurt on the job

AIM 3: To determine whether occupational health literacy is associated with adolescents' SES

Results

Overall, the crude associations between OHL and SES measured all three ways – as mother's highest degree earned (with four categories), as mother's having earned a college degree or not (dichotomously), and via the variable indicating whether the teen was working to support their family financially – consistentlydemonstrated that those of higher SES had *lower* levels of overall OHL. The p-value for the SES variable measured as education level were marginally significant (p=0.083) but the p-value for other two SES variables were both below 0.05 (Table 5). When we looked further into the subscales that make up OHL, we found that this pattern held for only the information subscale and the knowledge subscale. There was little evidence of any association between mother's education (measured dichotomously or in four categories) and the training subscale or the awareness subscale. However, in the crude associations, the variable indicating that working to provide financial support to their families is among the teens' reasons for working positively predicts greater overall OHL and greater scores for the information subscale and for the training subscale. No association between working to support one's family and the knowledge or awareness subscales was observed.

Table 5. Crude associations between SES and OHL scores (linear regression coefficients, p-values in parentheses).

	OHL	Information	Training	Knowledge	Awareness
Mother is college graduate	-0.39	-0.11	-0.05	-0.24	0.02
	(0.03)	(0.05)	(0.58)	(0.02)	(0.75)
Mother's Highest Degree*					
<High School	--	--	--	--	--
HS/Some College	-0.27	-0.16	0.09	-0.1	0.05
College Graduate	-0.49	-0.21	0.05	-0.15	0.02
Graduate Degree	-0.83	-0.25	-0.07	-0.7	0.14
	(0.08)	(0.05)	(0.70)	(0.02)	(0.58)
Works to support family	0.8	0.28	0.48	0.03	0.06
	(<0.01)	(<0.01)	(<0.01)	(0.78)	(0.29)

*Results of F-test with 3 degrees of freedom.

Adjusted results showed no association between SES (mother's education level measured dichotomously or in four categories) and OHL nor any of the subscales. A nearly significant positive association is observed between the awareness subscale and mother's highest degree earned with almost all the increase coming in the highest education level (graduate training) (p=0.07). However, working to support one's family remained statistically associated with the overall OHL score, as well as the information and the training subscales, after adjustment (Table 6 below).

Table 6. Adjusted^ associations between SES and OHL scores (linear regression coefficients, p-values in parentheses).

	OHL	Information	Training	Knowledge	Awareness
Mother is college graduate	-0.06	-0.02	-0.04	-0.08	0.09
	(0.72)	(0.74)	(0.68)	(0.46)	(0.19)
Mother's Highest Degree*					
<High School	--	--	--	--	--
HS/Some College	-0.12	-0.06	-0.01	-0.01	0.003
College Graduate	-0.17	-0.07	-0.01	-0.04	0.02
Graduate Degree	-0.12	-0.05	-0.13	-0.2	0.28
	(0.95)	(0.93)	(0.86)	(0.79)	(0.07)
Works to support family	0.43	0.20	0.36	-0.09	0.003
	(0.02)	(<0.01)	(<0.01)	(0.41)	(0.95)

^Models adjusted for age, gender, employment history duration, race and school location.

*Results of F-test with 3 degrees of freedom.

The adjusted models were examined in stratified analyses, using the Brockton/Lowell and Los Angeles/Oakland/Philadelphia groupings previously described. These stratified results show no effect of either measure of mother's education level on any of the OHL scores (Table 7 below). However, the association between working to support one's family and OHL scores did differ by strata. The overall OHL score as well as the information and the training subscales were all significant in the Brockton/Lowell group. In the Los Angeles/Oakland/Philadelphia group, these associations are also positive (working to support ones family which indicates lower SES predicts greater scores), but they are not statistically significant, perhaps reflecting lesser statistical power in this group. Both the knowledge and the awareness subscales were not significantly associated with working to support one' family in either group.

Discussion

The hypothesis that teens from higher socioeconomic backgrounds would have greater occupational health literacy was not supported by the data. Rather, it seems the opposite may be true, that teens of *lower* socioeconomic standing have higher levels of OHL. The strongest evidence of this comes from the variable indicating that working to support one's family is among the reasons the teen is working. The mean overall OHL score was significantly higher in the crude and fully adjusted models, as were the means for both the information and the training subscales. In addition, the means for overall OHL, information and training were elevated among those working to support their families for both groupings of schools. These scores were significantly higher in the Brockton and Lowell group; while all subscale means were elevated among those working to support their families, only training approached statistical significance in the Los Angeles/Oakland/Philadelphia group ($p = 0.06$), possibly reflecting the lesser power in this group. Adjusted models suggest that the awareness scores increase with higher SES, particularly for teens of the highest SES level in the sample (those with mothers with graduate training). This association trends more steadily and sharply for the Los Angeles/Oakland/Philadelphia group but remains not significant ($p = 0.17$), again possibly reflecting the lower statistical power in this group. It may be that coming from a higher SES background may lead to awareness (which reflects perspectives on whether "teen workers' injuries are preventable", whether "teens can make a difference in job safety", etc.) and that this may reflect a very different process than, for example, getting training on a more dangerous job. We suggest this possible distinction between the kinds of information received at school and on the job, and the socioeconomic factors that may be behind this difference should be investigated further in studies examining the associations between OHL, SES and work related injuries.

Table 7. Adjusted^ associations between SES and OHL scores stratified by school location groupings (linear regression coefficients, p-values in parentheses).**

	OHL		Information		Training		Knowledge		Awareness	
	1	2	1	2	1	2	1	2	1	2
Mother is college graduate	-0.09	0.07	-0.02	-0.04	-0.06	0.05	-0.09	-0.07	0.08	0.16
	(0.64)	(0.85)	(0.78)	(0.80)	(0.56)	(0.79)	(0.49)	(0.73)	(0.33)	(0.22)
Mother's Highest Degree*										
<High School	--	--	--	--	--	--	--	--	--	--
HS/Some College	-0.09	-0.12	-0.04	0.004	-0.02	0.05	-0.08	0.21	0.02	0.14
College Graduate	-0.17	-0.1	-0.05	-0.02	-0.04	0.08	-0.08	0.06	0.02	0.22
Graduate Degree	-0.14	0.28	-0.04	-0.13	-0.14	0.16	-0.3	0.34	0.24	0.6
	(0.96)	(0.88)	(0.97)	(0.91)	(0.86)	(0.98)	(0.69)	(0.74)	(0.18)	(0.17)
Works to support family	0.5	0.28	0.27	0.58	0.4	0.3	-0.15	0.02	0.04	-0.07
	(0.03)	(0.42)	(<0.01)	(0.63)	(<0.01)	(0.06)	(0.23)	(0.93)	(0.67)	(0.56)

^Models adjusted for age, gender, employment history duration, race, and school location.

**Groupings: 1=Brockton and Lowell; 2=Los Angeles, Oakland and Philadelphia

*Results of F-test with 3 degrees of freedom.

We believe these unexpected findings suggest that the association between SES and OHL (and its subscales) is the result of low SES teens getting jobs that are more dangerous than those obtained by teens of higher SES. It is possible that the lower SES teens get jobs where they receive more safety training, and have greater reason to seek out and/or be provided with other (non-training) safety information than those with jobs that are less hazardous. It may also be that teens of high SES backgrounds get higher levels of awareness from sources outside the workplace. Future studies of the potential protective benefits of OHLought to consider that some information may be obtained on the job because the job is dangerous and calls for it, and that other information may come from other sources that have little to do with one's work. In addition, future studies of the contexts that give rise to OHL should consider that some factors such as SES may drive these different kinds of information in opposite directions.

AIM 4: To determine whether low occupational health literacy among low SES adolescents is a mediating factor between low SES and elevated WRI prevalence

We expected to find that higher socioeconomic status predicted greater levels of OHL and wanted to explore if it was through greater OHL that higher SES reduced risk of work related injury. We observed that OHL as measured here was actually *lower* among those of higher SES. Therefore higher OHL cannot be a mediator through which higher SES may operate as a protective force regarding risk of work-related injuries. In order to conduct the analyses proposed under AIM 4 this association had to be present; as it was not, we were unable to achieve this Aim.

Study Conclusions

We believe there remains a solid theoretical basis for the concept of occupational health literacy and for its potential to protect young workers from injury, as presented earlier in this report. We believe that the mainly null findings of this exploratory study are more likely due to the limitations of this dataset and the difficulties in examining the potential value of occupational health literacy for protecting teen workers from work related injury than a truly absent association between OHL and work-related injury among youth.

This exploratory work has shown that more precise measurement of OHL and variables that may potentially confound its relationship to work injury is crucial to understanding the relationship between OHL and work injury. Much work needs to be done to fully understand the complexities of the OHL concept and how it operates as a potential protective factor for young worker injury. Future investigations of this subject would benefit from having a clearly established causal order of receipt of information and training and injury experiences, and may find it advantageous to examine a more narrowly focused group of teens performing similar job tasks in similar workplaces to account for the effect of job hazardousness.

Our results also caused us to rethink our hypothesis that lower SES teens would possess less OHL as our findings showed precisely the opposite: teens of *lower* socioeconomic status had higher levels of OHL. We believe these unexpected findings suggest that the association between SES and OHL (and its subscales) is the result of low SES teens getting jobs that are more dangerous than those obtained by teens of higher SES. It is possible that the lower SES teens get jobs where they receive more safety training, and have greater reason to seek out and/or be provided with other (non-training) safety information than those with jobs that are less hazardous. It may also be that teens of high SES backgrounds get higher levels of awareness from sources outside the workplace. Future studies of the potential protective benefits of OHL ought to consider that some information may be obtained on the job because the job is dangerous and calls for it, and that other information may come from other sources that have little to do with one's work. In addition, future studies of the contexts that give rise to OHL should consider that some factors such as SES may drive these different kinds of information in opposite directions.

Publications

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Inclusion Enrollment Table

Attached

References

1. United States Department of Health and Human Services, *Healthy People 2010. 2nd ed. With Understanding and Improving* Health *and Objectives for Improving Health. 2 vols*, 2000, U.S. Government Printing Office: Washington, DC.
2. Nutbeam, D., *Health literacy as a public health goal: a challenge for contemporary health education and communication strategies into the 21st century.* Health Promot. Int., 2000. **15**(3): p. 259-267.
3. National Institute for Occupational Safety and Health. *National Occupational Research Agenda*. Website: http://www2a.cdc.gov/nora/NORAabout.htm; Available from: http://www.cdc.gov/niosh/topics/youth/.
4. National Institute for Occupational Safety and Health, *Traumatic Occupational Injury Research Needs and Priorities: A Report by the NORA Traumatic Injury Team*, 1998, US Deptartment of Health and Human Services, Centers for Disease Control and Prevention: Washington, DC.
5. National Institute for Occupational Safety and Health, *NIOSH Alert: Preventing deaths, injuries and illnesses of young workers*, 2003, US Department of Health and Human Services. Centers for Disease Control and Prevention: Washington, DC.
6. National Institute for Occupational Safety and Health. *NIOSH Program Portfolio. Occupational Health Disparities*. Website: http://www.cdc.gov/niosh/programs/ohd/; Available from: http://www.cdc.gov/niosh/topics/youth/.
7. Greenberger, E. and L. Steinberg, *When teenagers work: The psychological and social costs of adolescent employment*1986, New York: Basic Books.
8. United States Bureau of Labor Statistics, *Labor force statistics from the current population survey*, Available at: www.bls.gov. United States Department of Labor.
9. Laraque, D., B. Barlow, and M. Durkin, *Prevention of youth injuries.* J Natl Med Assoc, 1999. **91**(10): p. 557-71.
10. National Institute for Occupational Safety and Health. *NIOSH Safety and Health Topic: Young Worker Safety and Health*. Website: http://www.cdc.gov/niosh/topics/youth/ 2006 January 2006]; Available from: http://www.cdc.gov/niosh/topics/youth/.
11. National Institute for Occupational Safety and Health, *Worker Health Chartbook*, 2004, US Department of Health and Human Services. Centers for Disease Control and Prevention: Washington, DC.
12. Committee on the Health and Safety Implications of Child Labor. National Research Council, *Protecting Youth at Work: Health, Safety and Development of Working Children and Adolescents in the United States*1998, Washington, DC: National Academy Press. Institute of Medicine.
13. United States Department of Labor, *Report on the Youth Labor Force*, 2000, US Department of Labor: Washington, DC.
14. McCall, B.P., I.B. Horwitz, and B.S. Carr, *Adolescent Occupational Injuries and Workplace Risks: An Analysis of Oregon Workers' Compensation Data 1990-1997.* Journal of Adolescent Health, 2007. **41**(3): p. 248-255.
15. Layne, L.A., et al., *Adolescent occupational injuries requiring hospital emergency department treatment: a nationally representative sample.* Am J Public Health, 1994. **84**(4): p. 657-60.
16. Banco, L., G. Lapidus, and M. Braddock, *Work-related injury among Connecticut minors.* Pediatrics, 1992. **89**(5 Pt 1): p. 957-60.
17. Brooks, D.R., L.K. Davis, and S.S. Gallagher, *Work-related injuries among Massachusetts children: a study based on emergency department data.* Am J Ind Med, 1993. **24**(3): p. 313-24.
18. Parker, D.L., et al., *Characteristics of adolescent work injuries reported to the Minnesota Department of Labor and Industry.* Am J Public Health, 1994. **84**(4): p. 606-11.
19. Mardis, A.L. and S.G. Pratt, *Nonfatal injuries to young workers in the retail trades and services industries in 1998.* J Occup Environ Med, 2003. **45**(3): p. 316-23.
20. Weller, N.F., et al., *Work-related injury among south Texas middle school students: prevalence and patterns.* South Med J, 2003. **96**(12): p. 1213-20.

21. Zierold, K.M. and H.A. Anderson, *Racial and ethnic disparities in work-related injuries among teenagers.* J Adolesc Health, 2006. **39**(3): p. 422-6.
22. Chen, E., A.D. Martin, and K.A. Matthews, *Socioeconomic status and health: do gradients differ within childhood and adolescence?* Soc Sci Med, 2006. **62**(9): p. 2161-70.
23. Brownell, M., D. Friesen, and T. Mayer, *Childhood injury rates in Manitoba: socioeconomic influences.* Can J Public Health, 2002. **93 Suppl 2**: p. S50-6.
24. Danseco, E.R., T.R. Miller, and R.S. Spicer, *Incidence and costs of 1987-1994 childhood injuries: demographic breakdowns.* Pediatrics, 2000. **105**(2): p. E27.
25. Durkin, M.S., et al., *The epidemiology of urban pediatric neurological trauma: evaluation of, and implications for, injury prevention programs.* Neurosurgery, 1998. **42**(2): p. 300-10.
26. Faelker, T., W. Pickett, and R.J. Brison, *Socioeconomic differences in childhood injury: a population based epidemiologic study in Ontario, Canada.* Inj Prev, 2000. **6**(3): p. 203-8.
27. Potter, B.K., et al., *Socioeconomic status and non-fatal injuries among Canadian adolescents: variations across SES and injury measures.* BMC Public Health, 2005. **5**: p. 132.
28. Rauscher, K. and D. Myers, *Socioeconomic Disparities in the Prevalence of Work-related Injuries Among Adolescents in the US.* Journal of Adolescent Health, 2008. **42**(1): p. 50-57.
29. d'Errico, A., et al., *Hospital injury rates in relation to socioeconomic status and working conditions.* Occup Environ Med, 2007. **64**(5): p. 325-333.
30. Dembe, A.E., et al., *Social inequalities in occupational health and health care*, 2005, National Institute for Occupational Safety and Health: Washington, DC.
31. Dembe, A., et al., *Social Inequalities in Occupational Health Care*, in *Acad Health Serv Res Health Policy Meeting*2002.
32. United States Department of Health and Human Services, *Chapter 11. Health Communication*, in *Healthy People 2010. 2nd ed. With Understanding and Improving Health and Objectives for Improving Health. 2 vols*2000, U.S. Government Printing Office: Washington, DC.
33. Kutner, M., et al., *The health literacy of America's adults: results from the 2003 National Assessement of Adult Literacy*, 2006, National Center for Education Statistics, US Department of Education: Washington, DC.
34. National Institute of Medicine, *Health Literacy: A Prescription to End Confusion*, 2004, The National Academies Press: Washington, DC.
35. Gazmararian, J.A., et al., *Public health literacy in America: An ethical imperative.* American Journal of Preventive Medicine, 2005. **28**(3): p. 317-322.
36. Lee, S.-Y.D., A.M. Arozullah, and Y.I. Cho, *Health literacy, social support, and health: a research agenda.* Social Science & Medicine, 2004. **58**(7): p. 1309-1321.
37. Cotugna, N. and C.E. Vickery, *Health literacy education and training: A student-professional collaboration.* Journal of the American Dietetic Association, 2003. **103**(7): p. 878-880.
38. Porr, C., *Health Literacy as an Empowerment Tool for Low-Income Mothers.* Family Community Health, 2006. **29**(4): p. 328-335.
39. Betz, C.L., *Health Literacy: The Missing Link in the Provision of Health Care for Children and Their Families.* Journal of Pediatric Nursing, 2007. **22**(4): p. 257-260.
40. Weiss, B.D., et al., *Quick assessment of literacy in primary care: the newest vital sign.* Ann Fam Med, 2005. **3**(6): p. 514-22.
41. Baker, D.W., et al., *Health Literacy and the Risk of Hospital Admission.* JGIM: Journal of General Internal Medicine, 1998. **13**(12): p. 791-798.
42. Volandes, A.E. and M.K. Paasche-Orlow, *Health literacy, health inequality and a just healthcare system.* Am J Bioeth, 2007. **7**(11): p. 5-10.
43. Baker, D.W., *Health Literacy and Mortality Among Elderly Persons.* Archives of Internal Medicine, 2007. **167**(14): p. 1503-1509.
44. Yin, H.S., S.G. Forbis, and B.P. Dreyer, *Health Literacy and Pediatric Health.* Current Problems in Pediatric and Adolescent Health Care, 2007. **37**(7): p. 258-286.
45. Wolf, M.S., J.A. Gazmararian, and D.W. Baker, *Health Literacy and Health Risk Behaviors Among Older Adults.* American Journal of Preventive Medicine, 2007. **32**(1): p. 19-24.

46. Osborn, C.Y., et al., *Health Literacy: An Overlooked Factor in Understanding HIV Health Disparities.* American Journal of Preventive Medicine, 2007. **33**(5): p. 374-378.
47. Gray, N.J., et al., *The Internet: A window on adolescent health literacy.* Journal of Adolescent Health, 2005. **37**(3): p. 243.e1-243.e7.
48. Manganello, J.A., *Health literacy and adolescents: a framework and agenda for future research.* Health Educ Res, 2007.
49. Marmot, M., *Social determinants of health inequalities.* Lancet, 2005. **365**(9464): p. 1099-104.
50. Link, B.G. and J. Phelan, *Social conditions as fundamental causes of disease.* Journal of Health & Social Behavior, 1995. **Extra Issue**: p. 80-94.
51. Link, B.G. and J.C. Phelan, *McKeown and the idea that social conditions are fundamental causes of disease.* Am J Public Health, 2002. **92**(5): p. 730-2.
52. Williams, D.R., *Socioeconomic Differentials in Health: A Review and Redirection.* Social Psychology Quarterly, 1990. **53**(2): p. 81-99.
53. Phelan, J.C., et al., *"Fundamental Causes" of Social Inequalities in Mortality: A Test of the Theory.* Journal of Health and Social Behavior, 2004. **45**(3): p. 265-285.
54. Breitkopf, C.R., H.C. Pearson, and D.M. Breitkopf, *Poor knowledge regarding the Pap test among low-income women undergoing routine screening.* Perspectives on Sexual & Reproductive Health, 2005. **37**(2): p. 78-84.
55. Cubbin, C. and M.A. Winkleby, *Protective and harmful effects of neighborhood-level deprivation on individual-level health knowledge, behavior changes, and risk of coronary heart disease.* American Journal of Epidemiology, 2005. **162**(6): p. 559-568.
56. Davis, S.K., M.A. Winkleby, and J.W. Farquhar, *Increasing disparity in knowledge of cardiovascular disease risk factors and risk-reduction strategies by socioeconomic status: Implications for policymakers.* American Journal of Preventive Medicine, 1995. **11**(5): p. 318-323.
57. Khoshnood, B., et al., *Socioeconomic Barriers to Informed Decisionmaking Regarding Maternal Serum Screening for Down Syndrome: Results of the French National Perinatal Survey of 1998.* American Journal of Public Health, 2004. **94**(3): p. 484-491.
58. Ribisl, K.M., et al., *The interplay of socioeconomic status and ethnicity on Hispanic and White men's cardiovascular disease risk and health communication patterns.* Health Educ. Res., 1998. **13**(3): p. 407-417.
59. Khoshnood, B., et al., *Socioeconomic barriers to informed decisionmaking regarding maternal serum screening for down syndrome: results of the French National Perinatal Survey of 1998.* Am J Public Health, 2004. **94**(3): p. 484-91.
60. Rudd, R.E., *Health literacy skills of U.S. adults.* Am J Health Behav, 2007. **31 Suppl 1**: p. S8-18.
61. Sudore, R.L., et al., *Limited literacy in older people and disparities in health and healthcare access.* J Am Geriatr Soc, 2006. **54**(5): p. 770-6.
62. Howard, D.H., T. Sentell, and J.A. Gazmararian, *Impact of Health Literacy on Socioeconomic and Racial Differences in Health in an Elderly Population.* Journal of General Internal Medicine, 2006. **21**(8): p. 857-861.
63. Manganello, J.A., *Health literacy and adolescents: a framework and agenda for future research.* 2007: p. cym069.
64. Brodie, M., et al., *Health information, the Internet, and the digital divide.* Health Aff (Millwood), 2000. **19**(6): p. 255-65.
65. Evans, G.W. and E. Kantrowitz, *Socioeconomic Status and Health: The Potential Role of Environmental Risk Exposure.* Annual Review of Public Health, 2002. **23**(1): p. 303-331.
66. Annie E. Casey Foundation, *Kids Count Data Book 2000*, 2000, Annie E. Casey Foundation: Seattle.
67. Kitsantas, A. and P. Kitsantas, *Predicting children's use of health enhancing behaviors: Do parental socioeconomic status, health knowledge, and self-regulation matter?* Polish Psychological Bulletin, 2005. **36**(1): p. 17-23.
68. Perkins, R., *Evaluation of an Alaskan marine safety training program.* Public Health Rep, 1995. **110**(6): p. 701-2.
69. Jensen, R. and E. Sinkule, *Press operator amputations: Is risk associated with age and gender?* Journal of Safety Research, 1988. **19**(3): p. 125-133.
70. Knight, E.B., D.N. Castillo, and L.A. Layne, *A detailed analysis of work-related injury among youth treated in emergency departments.* Am J Ind Med, 1995. **27**(6): p. 793-805.

71. Massachusetts Occupational Health Surveillance Program, *Work-related Injuries to Teens*, in *Newsletter from the Teens at Work Injury Surveillance and Prevention Project*1998, Massachusetts Department of Public Health: Boston, MA.
72. Schulte, P.A., et al., *Information dissemination and use: critical components in occupational safety and health.* Am J Ind Med, 2003. **44**(5): p. 515-31.
73. Dunn, K.A., et al., *Teens at work: a statewide study of jobs, hazards, and injuries.* J Adolesc Health, 1998. **22**(1): p. 19-25.
74. Evensen, C.T., et al., *The downside of adolescent employment: hazards and injuries among working teens in North Carolina.* J Adolesc, 2000. **23**(5): p. 545-60.
75. Zakocs, R.C., et al., *Improving safety for teens working in the retail trade sector: opportunities and obstacles.* Am J Ind Med, 1998. **34**(4): p. 342-50.
76. Runyan, C.W., et al., *Potential for violence against teenage retail workers in the United States.* J Adolesc Health, 2005. **36**(3): p. 267.e1-267.e6.
77. Rauscher, K.J. and D.J. Myers, *Socioeconomic disparities in the prevalence of work-related injuries among adolescents in the United States.* J Adolesc Health, 2008. **42**(1): p. 50-7.
78. Delp, L., et al., *Role of work permits in teen workers' experiences.* Am J Ind Med, 2002. **41**(6): p. 477-82.
79. Runyan, C.W., M. Schulman, and C.D. Hoffman, *Understanding and preventing violence against adolescent workers: what is known and what is missing?* Clinics in Occupational and Environmental Medicine, 2003. **3**(4): p. 711-720.
80. United States Bureau of Labor Statistics, *Injuries, Illnesses, and Fatalities*, 1999, US Department of Labor. Available at: http://www.bls.gov/iif/home.htm: Washington, D.C.
81. U.S. Census Bureau, *1990 Census Occupational Classification System.* 1990. **Available at: http://www.census.gov/hhes/www/ioindex/**.
82. Entwisle, D.R. and N.M. Astone, *Some Practical Guidelines for Measuring Youth's Race/Ethnicity and Socioeconomic Status.* Child Development, 1994. **65**(6): p. 1521-1540.
83. Hauser, R.M., *Measuring Socioeconomic Status in Studies of Child Development.* Child Development, 1994. **65**(6): p. 1541-1545.
84. Krieger, N., D. Williams, and N. Moss, *Measuring Social Class in US public health research: Concepts, methodologies and guidelines.* Annual Review of Public Health, 1997. **18**(1): p. 341.
85. Day Cheeseman, J. and E.C. Newberger, *The Big Payoff: Educational Attainment and Synthetic Estimates of Work-life Earnings*, in *Current Population Reports*2002, US Department of Commerce. US Census Bureau: Washington, DC.
86. Spiegelman, D. and E. Hertzmark, *Easy SAS calculations for risk or prevalence ratios and differences.* Am J Epidemiol, 2005. **162**(3): p. 199-200.
87. Barros, A.J. and V.N. Hirakata, *Alternatives for logistic regression in cross-sectional studies: an empirical comparison of models that directly estimate the prevalence ratio.* BMC Med Res Methodol, 2003: p. 3-21.
88. MacKinnon, D., A. Fairchild, and M. Fritz, *Mediation analysis.* Annual review of psychology, 2007. **58**: p. 593-614.

Program Director/Principal Investigator (Last, First, Middle): Rauscher, Kimberly Jean and Myers, Douglas Joseph

Inclusion Enrollment Report

This report format should NOT be used for data collection from study participants.

Study Title: Occupational Health Literacy, Socioeconomic Status & Work-related Injury to Teens

Total Enrollment: 2262 **Protocol Number:** WVU IRB: H-22501

Grant Number: 5R03OH009557-03

PART A. TOTAL ENROLLMENT REPORT: Number of Subjects Enrolled to Date (Cumulative) by Ethnicity and Race

Ethnic Category	Females	Males	Sex/Gender Unknown or Not Reported	Total	
Hispanic or Latino	149	130	6	285	**
Not Hispanic or Latino	862	755	26	1,643	
Unknown (individuals not reporting ethnicity)	62	68	204	334	
Ethnic Category: Total of All Subjects*	1,073	953	236	2,262	*
Racial Categories					
American Indian/Alaska Native					
Asian	275	209	10	494	
Native Hawaiian or Other Pacific Islander					
Black or African American	186	167	4	357	
White	378	357	10	745	
More Than One Race					
Unknown or Not Reported	234	220	**212**	666	
Racial Categories: Total of All Subjects*	1,073	953	236	2,262	*

PART B. HISPANIC ENROLLMENT REPORT: Number of Hispanics or Latinos Enrolled to Date (Cumulative)

Racial Categories	Females	Males	Sex/Gender Unknown or Not Reported	Total	
American Indian or Alaska Native					
Asian					
Native Hawaiian or Other Pacific Islander					
Black or African American					
White					
More Than One Race					
Unknown or Not Reported					
Racial Categories: Total of Hispanics or Latinos**					**

* These totals must agree.

** These totals must agree.