

VIOLENCE AGAINST TEACHERS: ETIOLOGY AND CONSEQUENCES

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**FINAL PERFORMANCE REPORT TO THE SPONSOR:
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**Susan G. Gerberich, Ph.D., Principal Investigator
Timothy R. Church, Ph.D., Co-Investigator
Patricia M. McGovern, Ph.D., Co-Investigator
Nancy M. Nachreiner, Ph.D., Project Director
Andrew D. Ryan, M.S., Research Fellow/Analyst
Mindy S. Geisser, M.S., Senior Research Fellow
Steven J. Mongin, M.S., Senior Research Fellow
Gavin D. Watt, B.A., Supervising Analyst/Programmer
Denise Feda, M.S., Ph.D., Research Coordinator
Starr Kelly Sage, M.P.H., Ph.D. Candidate, Graduate Research Assistant
Evette Pinder, M.P.H., Ph.D. Candidate, Graduate Research Assistant**

**Regional Injury Prevention Research Center and
Center for Violence Prevention and Control
Division of Environmental Health Sciences
University of Minnesota
School of Public Health
MMC 807, 420 Delaware Street S.E.
Minneapolis, Minnesota 55455
Telephone: 612-625-5934
Email: gerbe001@umn.edu**

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LIST OF TERMS AND ABBREVIATIONS

95% CI	95% Confidence Interval
MDE	Minnesota Department of Education
NPV	Non-Physical Violence (Consists of threats, sexual harassment, verbal abuse, and/or bullying)
NIOSH	National Institute for Occupational Safety and Health
OR	Odds Ratio
OSHA	Occupational Safety and Health Administration
PA	Physical Assault

ABSTRACT

Importance

Within the realm of violence, work-related violence has been recognized as a major problem. While there is an emerging literature pertinent to work-related homicides, there is a serious deficiency in the knowledge of non-fatal work-related violence and the associated risk factors. During 2006 alone, 516 work-related homicides occurred, making homicide the fourth leading cause of occupational fatality overall (U.S. Department of Labor, Bureau of Labor Statistics, 2007). While there is an emerging literature pertinent to work-related homicides, there is a serious deficiency in the knowledge of non-fatal work-related violence and the associated risk factors. According to Liberty Mutual (2007), in their annual "Workplace Safety Index," work-related injuries due to "assaults and violent acts" are among the ten leading causes of nonfatal occupational injuries, based on interviews with 200 executives responsible for workers' compensation and other commercial insurances at 125 mid-size firms and 75 large companies representing a range of geographic locations and industries. In 2004, these violent acts accounted for approximately one percent of all injuries on the job and cost approximately \$500 million (Liberty Mutual, 2007). At the national level, a minimum of two million non-fatal work-related acts of violence have been estimated to occur each year (Duhart, 2001; Bureau of Labor Statistics, www.bls.gov); associated costs have been estimated at over four billion dollars, per year, particularly due to lost work time (Albrecht, 1997). However, the true prevalence of occupational violence is unknown.

Objectives

This study was designed to identify the magnitude and consequences of the problem of work-related violence within a major occupational population and to identify specific risk factors, using a case-control design. The primary aims were to determine the relation between work-related violence in a cohort of licensed educators and: 1) personal exposures; 2) environmental situations/exposures in the work environment; and 3) characteristics of others in the environment.

Approach

The target population included all licensed registered educators in Minnesota (320,333). This population involves one of the few professions at risk for violence for which a database of contact and some demographic information is available for selection of subjects.

In this study, work-related violence was defined as the intentional use of physical force or emotional abuse, against an employee, that resulted in physical or emotional injury and consequences. This included physical assault (PA) and non-physical violence (NPV) (threat, sexual harassment, verbal abuse, and bullying). Work-related events included any activities associated with the educator's job or events that occurred in his/her work environment; work-related travel was included.

Pilot testing was conducted prior to each study phase that included a rigorous follow-up protocol. Prior to Phase I, 300 educators were selected to pilot test the survey instrument and methods. Based on results of this pilot testing phase, a large screening survey was sent to a random sample of 26,000 educators with a valid license as of 2003. This screening survey resulted in a total of 6,469 eligible responders. For Phase I, a specially-designed, comprehensive survey instrument was sent to these 6,469 educators. The purpose was to identify individuals who worked as educators in Minnesota during a 12-month period, to identify those who did and did not experience work-related violence during that same study period, and to collect comprehensive data on their work-related PA and NPV experience occurring during the past year.

Subsequently, a nested case-control study was used to examine the relation between potential risk factors and work-related PA. For each case ($n=372$), three controls ($n=1116$) were sampled from the population at risk during the study period. A questionnaire was then sent to the cases and controls to obtain data on work-related exposures, including characteristics of educators and significant others in the workplace and surrounding environmental factors. Cases were questioned about their exposures one month, or more, prior to the incident. Controls were questioned about their exposures on a randomly selected month from the study period to provide the person-time exposure information; key items were validated.

An overall conceptual model for the occurrence of work-related violence events, based on previous knowledge and the epidemiological model of human damage involving the dynamic

interactions of a host, agent(s) and vehicles (or vectors) within the environment, guided instrument development and study analyses. The ultimate goal of the data analyses was to estimate the impact of the above factors on work-related violence, controlling for important confounding factors. Univariate analyses were employed, first, to describe the characteristics of individual exposures, followed by the use of basic two-by-two tables or cross-tabulations to calculate the rate ratios (relative prevalence of exposure among cases/relative prevalence of exposure among controls) and confidence intervals. Logistic regression was used to investigate the relation between a specific exposure and the occurrence of work-related violence. Potential response bias was controlled by inversely weighting observed responses by probabilities of response, estimated as a function of characteristics available from the licensing database (Horvitz and Thompson, 1952). To account for unknown eligibility among non-respondents, probability of eligibility was estimated from these same factors (Mongin, 2001). Selection of confounders for multiple logistic regression models was based on Directed Acyclic Graphs (DAGs), following the methods described by Greenland et al. (1999). Confidence intervals for event rate estimates and regression coefficients were calculated by the bootstrap method (Efron and Tibshirani, 1993).

Key Findings

Based on pilot test results, it appeared that eligible licensed educators—those who had worked in a Kindergarten through Grade 12 school in the past year—very rarely had the classification of a “Lifetime License;” therefore the Screening Phase, prior to Phase 1, excluded “Lifetime Licensees” and those with licenses that expired before 2003.

For the comprehensive study, Phase 1, 84% responded; for Phase 2, 84% responded. Full length surveys were returned for 299 cases and 867 controls. The PA adjusted rate was 8.3 per 100 educators per year (95% Confidence Interval: 7.6-9.1). For NPV the adjusted rate was 38.4 per 100 persons per year (95% Confidence Interval: 37.1-39.8). Students were reported most frequently as the source of PA (95%) and NPV (75%).

Compared to zero times, respective risks (ORs; 95% CIs) for PA increased for educators working in environments where they witnessed students involved in: PA 1-3 (2.9; 2.0-4.4), 4-10 (6.6; 3.7-11.7), and 10+ (15.7; 7.8-31.3) times; threats 1-3 (1.5; 1.0-2.3), 4-10 (4.1; 2.4-6.9), and 10+ times (8.3; 4.6-14.9); sexual harassment 1-3 (1.9; 1.3-2.9), 4-10 (3.3; 1.7-6.4), and 10+ times (10.0; 4.5-22.2); verbal abuse, 10+ times (3.9; 2.3-6.6); and bullying, 10+ times (3.2; 1.9-5.5). Risks increased: for working in magnet versus non-magnet public schools (3.4; 1.1-10.7), with students perceived to be impaired because of disability or developmental delay (2.7; 1.2-5.7), in soft versus brightly lit areas (1.4; 1.1-2.0), and where barriers blocked vision (1.5; 1.1-2.2); and for educator classifications as social workers (7.3; 2.8-19.2) and special education (6.1; 4.2-8.8) versus classroom teachers. Risks decreased for working with ages 10+ versus less than 10 (0.6; 0.4-0.8), and having >8 versus <8 years of experience (0.6; 0.4-0.9).

The consequences of violence reported in this study deserve particular attention; those for NPV appeared even greater than those for physical violence. For example, 7.8% of educators who reported physical violence modified their work situation (quit work, transferred, etc.) compared to 24.7% of those who were bullied, 15.1% of those who were sexually harassed, 14.7% of those threatened, and 13.3% of those who were verbally abused.

Application to the Work Setting

This study is among the first such comprehensive efforts to identify the magnitude of the violence problem and specific risk factors in a major occupational population. From this effort, specific prevention and control strategies can be developed more realistically. In particular, attention to activities and environmental factors that place these people at risk is of great importance and need to be addressed by employers and relevant safety committees. This violence affects not only the victim but, also, the employer, others in the work environment, and significant others outside the work setting. Most importantly, this study serves as a basis for further in-depth research of specific risk factors, identified in the current effort, to examine additional opportunities for intervention efforts.

HIGHLIGHTS/SIGNIFICANT FINDINGS

Specific Aim I: Determine the magnitude of the violence problem and relevant consequences of both physical assault and non-physical violence.

Rates

Based on data from the *comprehensive study*, the adjusted PA rate for Kindergarten-Grade 12 teachers in Minnesota, based on incurring at least one assault, was 8.3 per 100 persons per year. Adjusted rates for males and females were 7.3 and 8.7, respectively.

For NPV (threats, sexual harassment, verbal abuse, and/or bullying), the adjusted rate was 38.4 per 100 educators per year. Adjusted rates for males and females, respectively, were 36.2 and 39.3.

Consequences

Reporting for PA is based on specific (one-time) events or ongoing events. Anatomically, specific PA events primarily involved: arm/elbow/wrist (41%); or leg (31%); also, involved, were: face (9%); hand/finger/thumb (8%); back (5%); and head/skull/brain (4%). For ongoing events the proportions differed, respectively: 72%; 66%; 41%; 41%; 18%; and 11%. The resulting types of physical injuries (either specific or ongoing events) reported most frequently were bruises/contusions, temporary discolorations/slap marks, cuts/lacerations/scratches, or abrasions.

Compared with those who reported PA, those who identified NPV reported greater consequences in terms of resulting symptoms and feelings. The most commonly reported consequences of both PA and NPV were frustration, anger, fear/anxiety/stress, sadness, fatigue, difficulty sleeping, and irritability, with much greater proportions reported for NPV for each of the consequences. Although 5% of educators who were physically assaulted reported persistent problems as a result of the event, 12% of educators who were threatened, 10% of those who were sexually harassed, 11% of those verbally abused, and 23% of those bullied reported persistent problems or symptoms because of the violence they experienced.

Similarly, consequences relevant to work situation changes appeared to be greater for those reporting NPV than PA. While 8% of educators reported changes in their work status as a result of physical violence, 16%, among those reporting NPV (verbal abuse, threat, sexual harassment and bullying) reported work changes, including those who quit as a result.

Specific Aim II: Examine the relation between work-related physical assault and characteristics/exposures of teachers. (Risks identified with ORs and 95% CI)

Risk of physical assault was decreased for educators working eight to less than 15 years (0.6; 0.4-0.9) and 25 years or more (0.4; 0.2-0.8), compared to working less than eight years. Similarly, those who had worked seven or more years in the current school also had a decreased risk (0.6; 0.5-0.8).

Based on their *primary professional activity*, and compared to classroom teachers, there were increased risks of assault for school social workers (7.3; 2.8-19.2) and special education educators (6.1; 4.2-8.8). Relevant to the *primary topic taught*, special education teachers had an increased risk of assault (3.7; 2.5-5.4), as did speech pathologists (2.3; 1.1- 5.1).

Educators who reported working part-time contract had a decreased risk, compared to full-time contract educators (0.4; 0.2-0.7). Similarly, substitutes had a reduced risk (0.5; 0.2-1.0), compared to those who were full-time educators.

Educators who reported being trained about using appropriate restraint techniques had an increased risk of assault (1.7; 1.1-2.7). Total hours spent in training also increased risk of assault for some groups. Specifically, compared to no hours in training, those who spent 5 to <10 hours in violence prevention training in the past 12 months had an increased risk (1.9; 1.0-3.5), as did those with 10 to less than 15 hours in training (2.9; 1.1-7.7).

Overall, the highest education level for educators also appeared to be related to risk of violence. Compared to those with Bachelor's Degrees, risk increased for those with: Master's Degrees (1.4; 1.1-1.9); Education Specialist Degree (1.9; 1.1-3.2); and Doctoral Degree (5.1; 1.6- 16.4).

Personal history of violence, both physical and non-physical, increased the risk of PA. Compared to no history of work-related PA, increased risks were identified for those with histories of: 1 to 3 events (15.0; 9.7-23.12); 4-10 events (21.5; 10.5-44.2); and more than 10 events (43.7; 17.1-111.3). Risk also increased for those with a history of violent events not related to work.

Specific Aim III: Examine the relation between work-related physical assault and characteristics of others in the environment. (Risks identified with ORs and 95% CI)

Based on data from the *comprehensive study*, the perpetrators of PA were most often students ($\geq 90\%$). For NPV, the perpetrators were primarily students (75%), but, also, involved parents/visitors/trespassers (20%) and school employees (17%).

School size also appeared related to violence. Schools with less than 50 students or 50 to 200 students had increased risks (respectively: 4.3; 1.7-11.1, 1.9; 1.0-3.5), compared to those schools with 501 to 1000 students. Schools with more than 1000 students had decreased risks (0.5; 0.3-0.8).

Compared to students age less than 10, educators working with children age 10 to less than 13, and 16 to less than 18 had decreased risks (0.6; 0.4-1.0 and 0.4; 0.3-0.8, respectively). Comparing exposures of educators working with the combined group of students 10 years and older, to the same reference group, the risk was similar (0.6; 0.4-0.8).

Risk also increased for working with students perceived to be impaired due to disability or developmental delay (2.7; 1.2-5.7). When the assigned students were primarily female, or if the gender appeared equal within the class, risk was decreased (0.3; 0.1-0.8 and 0.6; 0.4-0.9). If the educator viewed the race of the majority of the students taught as different from his/her own, risk was increased (2.5; 1.6-4.0); if they were "unsure" of race, risk was further increased (4.0; 1.4-11.9).

An inverse relation was identified for educators reporting parental/family/guardian involvement. The range for "Outstanding" to "Poor" was 0.2 (0.1-1.0) to 2.8 (1.7-4.6). In addition, risk of PA increased when other personnel were present in the classroom (1.4; 0.9-2.1).

Specific Aim IV: Examine the relation between work-related physical assault and environmental situations/exposures. (Risks identified with ORs and 95% CI)

Characteristics of the school and students were also analyzed. Educators working in a public magnet school had an increased risk of assault (3.4; 1.1-10.7) compared to those educators working in public schools; however, educators working in private schools had a decreased risk of assault (0.1; 0.1-0.4). Educators working in urban schools had increased risks compared with suburban schools (2.0; 1.4-2.8).

Compared to zero times, respective risks for PA increased for educators working in environments where they witnessed students involved in: PA 1-3 (2.9; 2.0-4.4), 4-10 (6.6; 3.7-11.7), and 10+ (15.7; 7.8-31.3) times; threats 1-3 (1.5; 1.0-2.3), 4-10 (4.1; 2.4-6.9), and 10+ times (8.3; 4.6-14.9); sexual harassment 1-3 (1.9; 1.3-2.9), 4-10 (3.3; 1.7-6.4), and 10+ times (10.0; 4.5-22.2); verbal abuse, 10+ times (3.9; 2.3-6.6); and bullying, 10+ times (3.2; 1.9-5.5). These trends were also observed when educators were made aware of students involved in these activities, even if the educator did not directly witness the events. Compared to zero times, respective risks (ORs; 95% CIs) for PA increased for educators working in environments where they were made aware of students involved in: PA 1-3 (1.8; 1.2-2.8), 4-10 (3.6; 2.1-6.2), and 10+ (5.5; 2.9-10.4) times; threats 1-3 (1.6; 1.1-2.5), 4-10 (3.1; 1.8-5.2), and 10+ times (6.4; 3.5-11.5); sexual harassment 1-3 (1.3; 0.9-1.9), 4-10 (4.9; 2.6-9.1), and 10+ times (6.4; 2.6-15.3); verbal abuse, 1-3 (1.6; 1.0-2.5), 4-10 (2.2; 1.3-3.8), and 10+ times (4.8; 2.8-8.1); and bullying, 1-3 (0.9; 0.6-1.4), 4-10 (1.8; 1.1-3.0), and 10+ times (3.0; 1.8-5.0).

These trends also continued if educators reporting witnessing person(s) other than students involved in violent events. Compared to zero times, respective risks for PA increased for educators working in environments where they witnessed: PA 1-3 (3.1; 1.7-5.9), 4 times or more (11.6; 1.8-75.6); threats 1-3 (2.8; 1.8-4.3), more than 10 times (9.3; 2.0-43.8); sexual harassment 4 times or more (3.9; 1.2-13.1); verbal abuse, 4-10 times (3.0; 1.5-5.9), more than 10 times (5.7;

2.2-14.2); and bullying, more than 10 times (8.2; 2.5-27.2). If the educator did not witness the event, but was made aware of the event by anyone other than a student, risk was also increased. Compared to zero times, respective risks for PA increased for educators working in environments where they were made aware of any person(s) other than students involved in: PA 1-3 times (1.9; 1.2-3.0); threats 1-3 times (1.7; 1.2-2.6), 4-10 times (3.0; 1.3-6.9), or 10+ times (5.1; 1.3-19.8); sexual harassment 1-3 times (1.8; 1.1-2.9); verbal abuse, 1-3 times (2.3; 1.6-3.3) and 10+ times (7.5; 3.2-17.5); and bullying, 4-10 times (2.1; 1.0-4.3), or more than 10 times (3.1; 1.1-9.0).

In addition to these perceptions, educators were also asked about the frequency of several characteristics in the work environment. Risk of PA was increased or decreased for the educators who reported the following characteristics (reference: "sometimes"): inadequate building safety: "always" (6.3; 2.0-20.0), "frequently" (2.3; 1.1-4.6), "never" (0.6; 0.4-0.9); inadequate coworker support "never" (0.6; 0.4-0.9); teaching unmotivated students "always" (2.2; 1.2-3.9), or "frequently" (1.5; 1.1-2.2); student behavior management "always" (2.5; 1.5-4.0), or "frequently" (2.2; 1.5-3.3); formal discipline of students "frequently" (1.6; 1.1-2.3); witnessing or being made aware of any violent events "always" (4.9; 2.1-11.6), "frequently" (2.3; 1.4-3.7), "infrequently" (0.5; 0.3-0.8), or "never" (0.2; 0.1-0.4).

How educators described their satisfaction with components of their typical work environment also was related to risk of PA. Compared to "satisfied," educators' risk was increased or decreased for the following characteristics: level of satisfaction with cleanliness of the school "very satisfied" (0.7; 0.4-1.0); satisfaction with temperature "somewhat satisfied" (0.6; 0.4-1.0); satisfaction with lighting "very satisfied" (0.6; 0.4-0.9); satisfaction with spaciousness of main entrance "somewhat dissatisfied" (1.8; 1.1-3.0); satisfaction with color scheme/artwork "very dissatisfied" (2.1; 1.2-3.8); satisfaction with building safety/ security "very dissatisfied" (2.0; 1.1-3.6); and satisfaction with school learning climate "very satisfied" (0.6; 0.4-1.0).

Educators were also asked about their level of agreement about their expectations of work-related violence. With a reference of "strongly disagree," educators had increased risks of violence if they felt coworkers expected assault was a possible consequence of the job: "strongly agree" (8.0; 4.1-15.6); "agree" (3.8; 2.5-5.8); or "disagree" (1.7; 1.1-2.7). When the educator was asked about their agreement with the statement, "I expected that assault was a possible consequence of the job," risk of PA was increased (compared to "strongly disagree") for those who answered "strongly agree" (9.1; 4.6-18.3), "agree" (5.4; 3.4-8.5), or "disagree" (2.2; 1.3-3.6).

In addition to these expectations about violence, educators were also asked about measures taken regarding these risks. Educators were asked about their level of agreement with the statement, "I took corrective/preventive measures against assault in the workplace." Compared to educators who "agreed," risk increased for those who "strongly agreed" they took corrective/preventive measures against assault in the workplace (1.5; 1.0-2.3); however, risk decreased for those who "disagreed" (0.4; 0.2-0.6), or "strongly disagreed" (0.1; 0.04-0.43).

Risks increased: for working in soft versus brightly lit areas (1.4; 1.0- 2.0), and where barriers blocked vision (1.5; 1.1-2.2). Decreased risk occurred in environments with easily accessible exits (0.3; 0.2-0.7). Educators who reported that assault deterrents "decreased my feeling of safety" had an increased risk of PA (5.8; 2.8-11.9).

Educators who felt their school did not have up-to-date technology had an increased risk of assault (1.4; 1.0-1.9), as did the feeling of a lack of sports equipment and facilities (1.9; 1.3-2.7), and musical facilities (1.9; 1.3-2.8). If educators noted a lack of sufficient economic resources for educators, risk was increased (1.6; 1.1-2.3). Risk also increased if the educator reported providing out of pocket expenses for educational purposes (1.9; 1.2-3.0). Compared to the educators' estimate that less than 25% of students received free lunch, educators reporting that between 25% and 50% of students received free lunches (1.6; 1.0-2.4) and more than 75% received free lunches (3.7; 2.1-6.7), had increased risks.

Policies related to violence had some relation to PA. Educators who reported written policies about confidentiality in reporting violent incidents had a decreased risk of violence (0.7; 0.4-1.0). Those who believed a zero tolerance policy was necessary to reduce violent events in their work environment also had a decreased risk of assault (0.6; 0.4-0.9).

TRANSLATION OF FINDINGS

This study is among the first such comprehensive efforts to identify the magnitude of the violence problem and specific risk factors in a major occupational population. From this effort, specific prevention and control strategies can be developed more realistically. In particular, attention to activities and environmental factors that place these people at risk is of great importance and need to be addressed by employers and relevant safety committees.

Additionally, much emphasis is needed on controlling non-physical violence. The outcomes resulting from non-physical, compared to physical, violence were particularly burdensome to this population of educators, and more often resulted in changes in their work activities and environment. In particular, educators who reported being bullied, identified the most severe outcomes.

Educators in certain types of professional activities appeared at increased risk, including special education teachers, and school social workers. Subsequent studies should include a focus on the specific activities for these groups of workers to further identify the factors that place them at risk.

Environmental characteristics and assault deterrents also appeared important. Measures to improve lighting and remove barriers are suggested as potentially important control measures. Also, assessment of previous exposures, including histories of violence, and working in environments, where frequent violent activities occur, may be integral to the development of relevant interventions.

This violence, investigated through this study, affects not only the victim but, also, the employer, others in the work environment, and significant others outside the work setting. Most importantly, the findings from this study serve as a basis for further in-depth research of specific risk factors, identified in the current effort, as a basis for developing additional opportunities for intervention efforts.

OUTCOMES/RELEVANCE/IMPACT

This study is the first such comprehensive effort to not only identify the magnitude of the violence problem in the population of Minnesota educators, but, also, to identify specific risk factors for work-related PA. This was accomplished through a highly rigorous scientific approach that included validation efforts to facilitate analyses that addressed potential bias. Sophisticated analytical techniques were applied to optimize the risk estimates. As a result, the findings from this effort provide an important contribution to the knowledge of work-related violence and, particularly, provide information on specific risk factors that serve as a basis for the development of appropriate prevention and control efforts. In addition, results of this effort provide unique opportunities for further in-depth investigation of key risk factors and serve as a basis for developing the most appropriate methods for controlling these factors in various school settings where educators, other personnel, and students are at high risk for violence.

SCIENTIFIC REPORT

BACKGROUND

Violence has not only been recognized as a major public health problem (Rosenberg and Fenley 1991) but, also, it has recently been recognized as a significant problem in the workplace. During 2006 alone, 516 work-related homicides occurred, making homicide the fourth leading cause of occupational fatality overall (U.S. Department of Labor, Bureau of Labor Statistics, 2007). While there is an emerging literature pertinent to work-related homicides, there is a serious deficiency in the knowledge of non-fatal work-related violence and the associated risk factors. Based on data extrapolated from the National Crime Victimization Surveys of 1993-1999, it was estimated that approximately 1.7 million non-fatal acts of violence occurred at work annually (Duhart, 2001). According to a recent survey conducted by the Bureau of Labor Statistics, U.S. Department of Labor, on behalf of the National Institute for Occupational Safety and Health, roughly five percent of the nation's 7.4 million business establishments, employing 128 million workers, had incidents of workplace violence within the 12 months prior to completing the survey on workplace violence prevention (response rate, 61%; these data are based on extrapolation from a representative sample of establishments) (Bureau of Labor Statistics, 2006). Yet, the true prevalence of work-related violence is unknown. The deficiency of knowledge of this problem among most occupational groups is inherent in the fact that little focused comprehensive research has been done.

Numerous biological (Kettl, 2001; Niehoff, 1999), psychological (Dollard et al., 1939), and socio-cultural (Bandura, 1973) theories have been generated relevant to the causes of violence. Among these, that have implications for the workplace, Bandura (1973) proposed that aggressive behaviors are learned by imitating familial, cultural, and media events. According to Berkowitz (1974), the lack of consequences, following acts of violence, reportedly tend to reinforce the behaviors. Messner (1988) has also theorized that, when violence is a normal problem-solving course of action, it does not stimulate guilt feelings and may be inherent in a regional culture of violence that results from the historical experiences of a particular region that contribute to the normalization of violence. The availability of and access to weapons, the frequency of violence portrayed in the media (Simonowitz, 1996), the widespread abuse of drugs and alcohol (Blue and Griffith, 1995), the decrease in medical and social services for the mentally ill and those requiring assistance, the use of violence by many to solve problems (Simonowitz, 1996), economic inequality (Messner, 1988; Klein et al., 1997), and inadequate access to goods and opportunities (Messner, 1988), are identified as potential risk factors for violence. As identified by Blue and Griffith (1995), violence is a subset of aggression that lies on the extreme end of the aggression continuum and involves a behavior that is influenced by particular social dimensions; it occurs in a social context and is reciprocally determined by the characteristics of the individual, that individual's behavior and the environment, and others in the environment. Biological factors, including neurotransmitter dysfunction and altered hormone levels have been implicated in violent consequences. Violence has also been identified as an elicited response to frustrating and situational circumstances (Blue and Griffith, 1995; Dollard, et al., 1939); it is a complex behavior and, like all behaviors, it occurs in the context of culture (Blue and Griffith, 1995). Understanding the situational contexts and the settings that place persons at risk for interpersonal interactions, that result in violent consequences, is critical to our knowledge of risk factors that will enable development of relevant intervention efforts.

Some of the most rigorous studies of work-related violence, to date, have used data collected as a matter of public policy, e.g., workers' compensation claims or death certificates. The limitation of these studies is that they only detect the most serious violent incidents -- those resulting in extended loss of work time or death. For example, Peek-Asa et al. (1997), analyzed California Employer's Reports of Occupational Illness and Injury from October 1, 1994 through January 31, 1995. The estimated annual rate of work-related assault injuries for California, based on only four months of data, was 82.5 per 100,000 workers -- over 50 times California's total occupational homicide rate (1.3 per 100,000). The estimated annual rate for the school industry was 269.7 per 100,000 reported workers. In another study by Peek-Asa et al. (1998), California police reports and employer reports of non-fatal work-related assaults were reviewed; from

these, an estimated annual assault rate of 184.6 per 100,000 workers was identified. Bensley et al. (1997), studied employees at a state psychiatric hospital during 1992 using three data sources: Workers' Compensation claims, hospital incident reports, and results of a staff survey. Survey data indicated a rate of 415 assault injuries per 100 employees per year, while incident reports showed a rate of 35 per 100, and workers' compensation claims revealed 13.8 per 100. Focusing only on workers' compensation claims for fatal and non-fatal cases would have resulted in significant underestimations of the extent of work-related violence.

Underreporting presents another difficulty in estimating the magnitude of this problem (Hesketh et al., 2003). According to the Bureau of Justice Statistics (Duhart, 2001), overall, only 44% of work-related violent crimes were reported to the police between 1993-1999 and, when considering teachers specifically, only 28% of work-related crimes were reported. In a study by Riopelle et al. (2000), of the 30 Los Angeles County employees who reported being assaulted in the past year, less than 24% filed an incident report or police report. Lion et al. (1981), also reported that violence against hospital personnel is underreported (less than one in five assaults). From the Northwestern National Life Insurance study (Lawless, 1993), it was estimated that 58% of harassment situations, 43% of threats, and 24% of attacks were unreported (n=600, response rate 29-52%, depending on eligibility criteria; Cole et al., 1997). Hypothesized reasons for underreporting included: the victim may have felt the violence resulted from a failure to deal effectively with the perpetrator (Yassi, 1994; Lion et al., 1981); the victim preferred not to take the time to complete the necessary report (Lion et al., 1981); or the victim may have felt that the violence was "a part of the job" (Riopelle et al., 2000; Gates et al., 1999; Yassi, 1994; Lion et al., 1981). Thus, focusing only on formally reported events would have resulted in a serious underestimation of the magnitude of this problem.

Prevalence of Violence Against Teachers

"The safety of our students, teachers, and staff at our nation's schools continues to be an issue of paramount importance," according to DeVoe, et al. (2002). With numerous recent episodes of school violence, public attention has been drawn to the concern of safety at school; yet, much of this attention has focused on violence against students, while violence against teachers has been less emphasized (Kachur et al., 1996). Students are not the only ones who are victims of crime at school; teachers are also targets of violence and theft in schools. In addition to the personal toll that violence may take on teachers, those who worry about their safety may have difficulty teaching and may leave the profession altogether. Information on the number of crimes against teachers at school can help show the nature and prevalence of the problem (DeVoe et al., 2002). Although the published scientific literature on violence directed toward teachers is sparse (Fisher and Kettl, 2003; Levenson et al., 2000), this is an important problem (Barab, 1996; Bloch and Bloch, 1980) that needs to be addressed.

Estimates of the numbers and rates of assaults sustained by teachers vary by study, because of differing populations studied, definitions of violence, study periods, and methods. The Metropolitan Life Insurance Company conducted a survey of U.S. public school teachers in 1993, and reported that 11% of teachers had been victims of violence (Mushinski, 1994). In 1998, the company conducted a follow-up survey on violence in American schools (Binns and Markow, 1999) by telephone interviews with 1,000 third through twelfth grade public school teachers. In 1998, the percentage of teachers reporting ever being a victim of school violence increased to one in six (16%) public school teachers. When asked about who had perpetrated the violence, teachers indicated that 90% of violent incidents were perpetrated by students, 5% by parents, and 4% by an unknown perpetrator (Binns and Markow, 1999). Teachers also reported that none of their violent events were perpetrated by "another teacher/faculty member" or "another school employee."

According to a fact sheet published by the Centers for Disease Control and Prevention (CDC), 11% of the school-associated violent deaths occurred among teachers (CDC, 1999). Warchol (1998) estimated 138,124 annual violent victimizations of teachers in their workplaces between 1992-1996, based on data from the National Crime Victimization Survey. More recently, among the occupations studied from the National Crime Victimization Survey (1993-1999), teachers had the third highest rate of simple assault (per 1,000 teachers), behind law enforcement and mental health occupations (Duhart, 2001). According to the Center for Public

Policy Priorities (1999), the number of assaults against teachers/staff ranged from 6,238 to 3,927 per year from 1994 through 1998, with rates per 1,000 students ranging from 1.0 to 1.7.

During the 1999-2000 school year, 9% of elementary and secondary school teachers were threatened with injury by a student from their school, and 4% of teachers were physically attacked by a student (DeVoe et al., 2002). In the Metropolitan Life Insurance survey, 6% of seventh through twelfth grade students surveyed reported previously threatening a teacher (Everett and Price, 1995).

Annually, school crime and safety statistics are summarized and issued in a report by the Bureau of Justice Statistics and National Center for Education Statistics. This report, entitled, "Indicators of School Crime and Safety," examines the crime that occurs both in schools and while teachers and students are in transit to and from school. The findings in the 2004 report are based on student, teacher, and principal accounts as well as data from the National Crime Victimization Survey (1992-2002), School Crime Supplement to the National Crime Victimization Survey (1995, 1999, 2001, and 2003), Youth Risk Behavior Survey (1993, 1995, 1997, 1999, 2001, 2003), School Survey on Crime and Safety (2000), and School and Staffing Survey (1993-1994 and 1999-2000). According to the 2004 report, between 1998 and 2002, teachers reported experiencing about 234,000 nonfatal crimes in a school environment; these included 144,000 thefts and 90,000 violent crimes (rape, sexual assault, robbery, aggravated assault, and simple assault) (DeVoe, 2004). During the 1999-2000 school year, nine percent of all K-12 educators were threatened with injury/violence by a student, and four percent were actually physically assaulted by a student (DeVoe, 2004). According to Dinkes et al. (2007), during the 2003-2004 school year, educators experienced 253,100 threats of injury and 127,500 physical attacks by students in elementary and secondary schools.

According to the 2007 report on "Indicators of School Crime and Safety," during 2003-2004, elementary school teachers experienced more physical attacks from students than secondary teachers (3.5 and 2.3 percent of teachers, respectively) (Dinkes et al, 2007). In contrast, 5.8 percent of elementary teachers, and 8.0 percent of secondary teachers reported threats with injury from a student (Dinkes et al., 2007). Meanwhile, teacher reports of actual assaults or physical attacks ranged from 1 to 7 percent (Dinkes et al., 2007).

Violence Against Teachers: Minnesota

Across the country, teachers experience threats and assaults at different rates. The percentage of public school teachers, across all states, who reported having been threatened in the previous twelve months ranged from 4 to 18 percent (Dinkes et al., 2007). In Minnesota, 4.5, 4.5, and 3.6 percent of teachers working during the years 1993-1994, 1999-2000, and 2003-2004, respectively, reported that they had been physically attacked by a student during the previous 12 months (Dinkes et al., 2007). Further, for the same time periods, respectively, 9.6, 9.5 and 8.2 percent of Minnesota's teachers reported they had been threatened with injury by a student during the previous twelve months during (Dinkes et al., 2007).

The number of Minnesota Workers' Compensation assault indemnity claims (involving more than three calendar days of disability) ranged between 277 and 465 claims during the period, 1995-2001 (Zaidman, 2003). According to the Minnesota Department of Labor (Zaidman, 2003), between 1995 and 2001, assaults comprised an annual average of 1% of all Minnesota indemnity claims. However, when considering only non post-secondary teachers in public administration, elementary and secondary education (SIC code 8211), the percentage of indemnity claims from assaults was much higher, ranging from 4.4% for elementary school teachers, to 4.9% for secondary school teachers, 6.7% for pre-kindergarten and kindergarten teachers, and 17.4% of all claims for special education teachers. *This information is believed to represent a serious underestimate because these data only enable identification of more severe events.* According to limited data from the Minnesota Workers' Compensation database (Zaidman, 2003) and data from the National Crime Victimization Survey (Duhart, 2001), in concert with data from a prior occupational violence study conducted by the principal investigator (Gerberich et al., 2002), it was conservatively estimated that there would be a minimum of five physical assaults and 20 non-physical violence events per 100 teachers per year.

Regulations

Currently, there is no mandate from the federal Occupational Safety and Health Administration (OSHA) regarding work-related violence prevention measures -- only recommendations. Even though there is no official standard regarding work-related violence, the federal OSHA General Duty clause does require employers to provide a safe working environment for their employees (OSH Act, 1970). Employers would only be cited under the General Duty clause if the following four criteria were met: 1) a condition in the work environment presents a hazard; 2) the hazard was recognized by the employer individually or by the employer's industry in general; 3) the recognized hazard was likely to cause death or serious physical harm; and 4) there was a feasible means of abating the hazard (Office of the Inspector General, 2001). In practice, citations regarding work-related violence under the General Duty clause are quite rare, with a total of eight citations to private establishments, and two to federal facilities reported in the U.S. between 1993-1995 (Barish, 2001; Office of the Inspector General, 2001).

Minnesota has additional statutes related to school violence. According to Minnesota Statute (609.2231; subdivision 5), "Whoever assaults a school official while the official is engaged in the performance of the official's duties, and inflicts demonstrable bodily harm, is guilty of a gross misdemeanor. As used in this subdivision, 'school official' includes teachers, school administrators, and other employees of a public or private school."

In Minnesota, school districts are required to submit individual reports of each dangerous weapon incident involving a student to the Minnesota Department of Education. During the 2004-2005 school year, 1,322 incidents were reported, although it is not possible to estimate the number of incidents that went unreported (Minnesota Department of Education, 2006).

Potential Risk Factors

Numerous potential risk factors for violence have been suggested, including characteristics of the *perpetrator, victim, and the environment*. Specific examples follow: the easy availability of weapons (Simonowitz, 1996); the frequency of violence portrayed in the media (Kettl, 2001; Simonowitz, 1996); the widespread abuse of drugs and alcohol (Simonowitz, 1996; Blue and Griffith, 1995); the use of violence by many to solve problems (Simonowitz, 1996); economic inequality (Messner, 1988; Klein et al., 1997); inadequate access to goods and opportunities (Messner, 1988); and lack of parental supervision (Everett and Price, 1995).

Teacher Characteristics

Based on one investigation, male, compared with female, teachers were more likely to be victims of violent crimes (51 versus 22 crimes per 1,000 teachers) during 1996-2000 (DeVoe et al., 2002); but, female teachers were more frequently victims of theft (49 and 38 per 1,000, respectively; DeVoe et al., 2002). From their research, Binns and Markow (1999), did not find a difference in victimization of teachers by gender. Yet, during the 2003-2004 year, male compared to female educators experienced an elevated level of student-perpetrated threats (8.5 versus 6.3 percent, respectively; Dinkes et al., 2007).

Nearly 37% of public school teachers believed there are particular groups of teachers who are more likely to be victims of violence (Binns and Markow, 1999). These groups included: unfair, unbending, or aggressive teachers; timid, weak, shy or passive teachers; teachers with no control over their classroom; and women teachers. When seventh through twelfth grade students were asked about risk factors for teacher violence, they also cited strict teachers but, also, included gay or lesbian teachers, female and younger or less experienced teachers, older teachers, and male teachers (Binns and Markow, 1999). Flaherty (2001), noted teachers who have unclear rules for classroom behavior and/or inconsistent attitudes and differential treatment of students may be also at increased risk of violence.

Based on National Crime Victimization Survey (NCVS) data from 1993-1999, victimizations per 1,000 workers ranged from 1.6 per 1,000 for college/university teachers, 16.8 per 1,000 for elementary school teachers, 38.1 per 1,000 for high school teachers, 54.2 per 1,000 for junior high teachers, to 68.4 per 1,000 for special education teachers, compared with the overall percentage of 12.6 per 1,000 workers for all occupations (Duhart, 2001). In a review of NCVS

data from 1996-2000, violent crimes per 1,000 teachers varied with the grade levels being taught: middle/junior high (49); senior high (35); and elementary (15) (DeVoe et al., 2002). These rates are nearly identical to those found by Duhart (2001), in a review of National Crime Victimization Data from 1993-1999, who reported elementary teachers experienced the least violence (17 per 1,000 teachers), while junior high and senior high teachers reported rates of 54 and 38 per 1,000, respectively. When combining theft and violent crimes, middle/junior high school teachers, compared with senior high and elementary school teachers, still had the highest average annual rates of nonfatal crimes against teachers (107 compared with 91 and 51 per 1,000 teachers, respectively; DeVoe, et al., 2002). In contrast, based on telephone interviews with 1,000 teachers, nationally, Binns and Markow (1999) did not find that teachers' experience with or perceptions of violence varied by grade level. However, the methods and populations were different for these studies.

Consistent with previous reports, the most recent report, "Indicators of School Crime and Safety," indicated that during the 2003-2004 period, elementary school teachers experienced more physical attacks from students than secondary teachers (3.5 and 2.3 percent, respectively; Dinkes et al., 2007). In contrast, 5.8 percent of elementary teachers, and 8.0 percent of secondary teachers reported threats with injury from a student (Dinkes et al., 2007).

Student Characteristics/Behaviors:

Among those public school teachers who were the victims of school violence, 90% reported that a student committed the violence. Only 5% reported the parents as perpetrators (Binns and Markow, 1999).

Hutton (1984) studied 50 suburban school teachers and reported that the behavior category of "aggressive interaction with or between students" was of most concern, and most disturbing, to teachers. Other categories examined included peer avoidance, inappropriate behavior, depressive reaction, and anxiety reaction.

Buka and Earls (1993), cited the single strongest predictor of violence in adolescence and adulthood as antisocial behavior. The authors also cited additional characteristics of children as potential early predictors of delinquency and violence: behavior problems; low intelligence quotient; attention deficit hyperactivity disorder; learning disability; poor motor-skill development; prenatal and perinatal complications; minor physical anomalies; and head injuries.

Of the 1,000 public school teachers interviewed for the MetLife survey, regarding major factors contributing to school violence, the following factors were identified: lack of parental supervision (77%); lack of family involvement with school (69%); peer group pressure (59%); lack of motivation to learn (46%); drug and/or alcohol use (32%); poverty (29%); and gang or group membership (21%) (Binns and Markow, 1999).

Student Gender

Males are most frequently described as the perpetrators of work-related violence (Flaherty, 2001; Kettl, 2001; Duhart, 2001). However, Binns and Markow (1999) reported that teachers perceived that female students' involvement as aggressors in violent acts at school has increased in the past five years.

Student Age

Based on analyses of the School Survey on Crime and Safety (SSOCS) 2006, which was administered to a nationally representative random sample of 3,565 K-12 public school principals (78% response rate), the overall rate of violent incidents occurring in schools varied by the age and grade level of the students enrolled in a particular school (Noelle, 2007). The rate of violent incidents (i.e., physical attack or fight with or without a weapon, threat of physical attack, robbery with or without a weapon, rape, and sexual battery other than rape) in primary, middle, and high schools was 25, 52, and 26 incidents per 1000 students, respectively (Noelle, 2007)

Student Race

Of the 1,000 public school teachers interviewed, student race was reported as a major factor in school violence by 20% of the teachers, while 42% and 38%, respectively, indicated it as a minor factor, or not relevant (Binns and Markow, 1999).

Student -Family Situations

In a study of students from Albuquerque, New Mexico, violent elementary school boys (defined as those students who received two or more infraction notices from teachers during the first semester of the school year for any of seven violent behaviors, such as fighting, bringing dangerous items to school, or using gangs to intimidate others) were more likely not to live with their fathers, have unmarried parents, have more siblings, and to have fathers that did not show them affection (Sheline et al., 1994). Additional family characteristics, potentially leading to violence, included: parenting practices (lack of parental supervision, parental rejection, lack of parental involvement, poor parental disciplinary practices); family criminal behavior; child abuse/neglect; poor marital relations; parental absence due to divorce or separation; and large family size (Fisher and Kettl, 2003; Johnson and Fisher, 2003; Buka and Earls, 1993).

Gangs

Based on the Minnesota Student Survey (Minnesota Department of Children, Families, and Learning, 1999), 13% of female and 17% of male twelfth graders believed that gang activity is a problem at school. Criminal histories, gang membership, alcohol and other drug use were frequently cited as potential risk factors for violence (Fisher and Kettl, 2003; Flaherty, 2001; Kettl, 2001; Binns and Markow, 1999; Kachur et al., 1996; Valois et al., 1995; Everett and Price, 1995). Based on public school principal's reports of violence at their schools, the annual rate of gang-related crimes occurring at K-12 schools was 0.6 incidents per 1,000 students (Noelle, 2007).

Weapon Carrying

Flaherty (2001) reported that guns are a major factor in youth violence. From a study of 4,137 South Carolina ninth through twelfth graders, Valois et al., (1995) reported that approximately 38% of males and 11% of females admitted carrying a weapon in the past 30 days. During the 1991-1992 school year, 21% of all ninth through twelfth grade New York City students surveyed reported carrying a weapon, such as a gun, knife, or club anywhere in the past 30 days (Ginsberg and Loffredo, 1993). In a review of interview data from the National Longitudinal Study of Adolescent Health (n=11,486), 12.4% of students indicated they had carried a weapon in the past 30 days (Resnick et al., 1997). The Minnesota Department of Children, Families, and Learning (1999) published results, pertinent to weapons, from the Minnesota Student Survey. In 1998, 6% of males in grade 12, and 6% of males in grade 9 reported carrying a gun on school property in the past 30 days. However, carrying other weapons, such as knives, was even more common, with 16% of male ninth graders, and 12% of male twelfth graders carrying other weapons on school property in the past 30 days.

From the MetLife survey (Binns and Markow, 1999), over 50% of teachers perceived that students carried weapons to school, with knives (79%) as the most frequently mentioned weapon; 22% mentioned handguns. In addition, more than half of the teachers surveyed believed that students have easy access to handguns or other firearms (Binns and Markow, 1999).

The gun-free schools act requires states receiving federal funding, under the elementary and secondary education act, to enact a state law requiring local educational agencies to expel from school any student caught bringing a firearm to school for at least one year (Gray and Sinclair, 2000). The law also requires an annual report to the Department of Education regarding the number of students expelled. During the 1998-1999 school year, 3,523 students were expelled for bringing a firearm to school; of these 57% were high school students, 33% were junior high students, and 10% were elementary students (Gray and Sinclair, 2000).

Characteristics of Youth Causing School Fatalities

The National School Safety Center (1998) identified the following list of characteristics of youths who caused school fatalities: history of tantrums and uncontrollable angry outbursts; characteristically resorted to name calling, cursing, or abusive language; habitually made violent threats when angry; previously brought a weapon to school; history of serious disciplinary problems at school and in the community; history of drug, alcohol use or other substance abuse or dependency; on the fringe of his/her peer group with few or no close friends; preoccupied with weapons, explosives or other incendiary devices; prior truancy, suspension, or expulsion from school; displayed cruelty to animals; little or no supervision and support from parents or a caring

adult; had witnessed or been a victim of abuse or neglect in the home; had been bullied and/or bullied or intimidated peers or younger children; tended to blame others for difficulties and problems s/he caused her/himself; consistently preferred television shows, movies, or music expressing violent themes and acts; preferred reading materials dealing with violent themes, rituals, and abuse; reflected anger, frustration, and the dark side of life in school essays or writing projects; was involved with a gang or an antisocial group on the fringe of peer acceptance; was often depressed and/or had significant mood swings; or had threatened or attempted suicide.

Environmental Characteristics

Location of Assault

According to 1,000 public school teachers surveyed, the majority of violent acts against teachers occurred in the school building (81%), while 13% occurred on school grounds, and less than 3% occurred in the school neighborhood (Binns and Markow, 1999).

Location of School

Based on the "School Indicators of Crime and Safety, 2007," school location (i.e., city, suburban, town, and rural) influenced likelihood of student-perpetrated threats and assaults toward educators. Of the public school teachers working in city, suburban, town, and rural schools, 11.6, 6.6, 5.6, and 4.8 percent experienced threats of injury from a student during the previous 12 months (Dinkes et al., 2007). Nolle (2007) found violent incident rates for schools located in cities, urban fringe areas, towns, and rural areas, to be 38.1, 27.1, 31.9, and 28.7 per 1,000 students, respectively (Noelle, 2007). In addition, DeVoe et al. (2002), found urban teachers were more likely to be victims of violent crimes (36 per 1,000 teachers) than suburban (21 per 1,000) or rural teachers (17 per 1,000). Similar patterns were observed when reviewing the rates of thefts per 1,000 teachers; urban, suburban, and rural teachers, respectively, had identified rates of 53, 46, and 31 (DeVoe et al., 2002). Binns and Markow (1999) also reported that public school teachers in urban locations are less likely than those in suburban or rural locations to feel very safe when they are at school. Flaherty (2001) also reported urban schools (compared with rural or suburban) are much more prone to violence, and that schools are a part of their larger neighborhood and, thus, reflect the characteristics of that community.

Type of School

Based on data reported by Dinkes et al. (2007), public school teachers experienced more threats of injury and assaults; 7.5 percent of public and 2.3 percent of private teachers were threatened with injury by a student, while 3.7 and 1.6, respectively, were actually physically attacked. DeVoe et al. (2002), also reported that public school teachers were more likely than private school teachers to be victimized by students during 1999-2000. Of school teachers who reported they were threatened with injury by a student, the proportion of public, compared with private school teachers, was greater (10% versus 4%); similarly, 4% of public school teachers reported being physically attacked by a student, compared with 2% of private school teachers (DeVoe et al., 2002).

School Social Context

Baker (1998) reported that children at high risk of violence are disadvantaged in their ability to participate meaningfully in the school community, thus, impeding an important avenue for prevention and intervention; therefore, school violence results from a poor fit between a child's developmental capacities and the social context of the school. The crowdedness of the classroom and the task-driven nature of the curriculum require children to have adequate self-management skills (such as impulse control and delayed gratification). At-risk children may not have the skills to negotiate or derive meaning from these activity settings, thus, creating psychological distancing from the culture of the school. If students perceive the school environment as hostile or threatening, they may respond with a range of violent behaviors (Baker, 1998).

School Discipline Problems

Stebbins (1970) defined disorderly behavior as, "impeding the teacher's instructing effectiveness or the student's learning potential or when it is simply violating the rules of classroom conduct or any combination of these three." Stebbins (1970) suggested experienced teachers do not discuss disorderly behavior; therefore, no specific cultural definitions exist to guide the responses of individual teachers other than their own experiences.

Based on the Principal/School Disciplinarian Survey on School Violence (1996-1997), 16% of public schools (n=12,400 schools) reported at least one of 17 discipline issues (such as verbal abuse of teachers, physical abuse of teachers, etc.) was a serious problem in their school (Kaufman et al., 2001).

The most common consequences following violence reported by students included suspension or expulsion from school (Binns and Markow, 1999; Everett and Price, 1995). Instituting dress codes, starting a disciplinary code, or using police or security guards were other consequences mentioned by students (Everett and Price, 1995).

Reporting

Based on the Principal/School Disciplinarian Survey on School Violence, during the 1996-1997 school year, 57% of public schools (n=44,000 schools) reported at least one criminal incident to the police, including 10% of schools (n=7,900 schools) that reported at least one serious violent incident (murder, rape or other sexual battery, suicide, physical attack or fight with a weapon, or robbery), and 47% (n=36,100 schools) that reported less serious incidents (physical attack or fight without a weapon, theft/larceny, and vandalism) (DeVoe et al., 2002; Kaufman et al., 2001). Zirkel (2002) recommended that, "Principals can help protect themselves and other school personnel by vigorously pressing criminal charges for assault and by assisting with civil suits for assault and battery."

Of the 1,000 public school teachers interviewed in the MetLife survey, 92% of the teacher victims reported the incident to school officials or the police (Binns and Markow, 1999). Less than half (44%) of work-related violence events were reported to the police, according to results from the national crime victimization survey (1993-1999) (Duhart, 2001). The most commonly cited reason for not reporting the incident to the police was because the violent victimization was, "dealt with in another way" (Duhart, 2001). However, another reason for low reporting rates may be that teachers are discouraged from reporting school violence (Bloch, 1978).

Policy

Even though OSHA has set forth policy recommendations, there is currently very little literature that addresses the impact of work-related violence prevention policy on work-related PA. A sound, violence prevention policy is often recommended to deal with work-related violence (Fisher and Kettl, 2003; Johnson and Fisher, 2003; Department of Justice, 2000; Eisele et al., 1998; Fitzgerald, Dienemann, and Codorette, 1998; Trape, 1998; Yassi et al., 1998; Simonowitz et al., 1997; Baron, 1996; Simonowitz 1995; Liss and McCaskell, 1994; Lawless, 1993). However, literature regarding policy effectiveness is lacking.

Some schools have addressed violence concerns by instituting a number of different protective measures, such as adopting zero-tolerance policies, requiring students to wear uniforms, hallway monitors, using visitor sign-in and metal detectors, having police or other law enforcement representatives stationed at the school, and offering students and teachers violence prevention programs (Kaufman et al., 2001; Binns and Markow, 1999). Based on the Principal/School Disciplinarian Survey on School Violence (1996-1997), 79% of public schools reported they had a zero-tolerance policy for violence, 96% of public schools reported visitors must sign in, and 78% reported they had some type of formal school violence prevention or reduction program/effort (Kaufman et al., 2001).

Training

Currently, there is very little literature about the impact of work-related violence prevention training on work-related violence. Training is often recommended, anecdotally, as part of the comprehensive approach to deal with work-related violence; however, little scientific evidence exists on the effectiveness of this type of intervention (Lipscomb et al., 2002; Department of Justice, 2000; Kiely and Pankhurst, 1998; Trape, 1998; Simonowitz et al., 1997; Baron, 1996;

Warshaw and Messite, 1996; Simonowitz 1995; Liss and McCaskell, 1994; Lawless, 1993). Binns and Markow (1999) found approximately 47% of public school teachers participated in a violence prevention program to help teachers deal effectively with, or reduce, violence in school. Webster (1993) reviewed school-based conflict resolution programs for adolescents and found little convincing evidence that these training programs reduced interpersonal violence.

Costs and Consequences of Violence

The physical, emotional, and financial costs of violence to the victim, and society, in general, appear to be important. Occupational violence has been associated with diminished efficiency and reduced productivity, increased turnover, absenteeism, counseling costs, decreased staff morale, and reduced quality of life (Center for Mental Health Services, 1994; Health Services Advisory Committee, 1987; Miller et al., 1993). However, there is relatively little empirical literature and it is limited by the types of study designs that have been used (Bulatao and VandenBos, 1996); these include: the use of cross-sectional designs, thus, limiting inferences about casual relations; small sample sizes that challenge the reliability of findings; and institution-specific populations which limit the generalizability of study findings. However, these studies are important first steps in the development of the knowledge base addressing the effects of work-related violence.

Financial Costs

Financial costs of violence, such as lost work-time, productivity, medical costs, and costs incurred from replacing staff who leave their positions following an assault incident, make up one piece of the cost of violence. Over a four-month period in 1987, 66 assault incidents were studied at a large neuro-psychiatric Veterans' Administration hospital (Lanza and Milner, 1989). From these incidents, the following annual costs, which totaled approximately \$38,000, were estimated: staff time for dealing with the assaults (\$14,667); medical costs (\$1440); employee assistance counseling services (total 70 hours, \$1,352); police time estimated at 33 minutes per assault for at least two police officers (\$1,788) and police secretary time (\$456); 240 hours personnel service time to process paperwork on assaults (\$2,000); administration time to process assault-related forms (\$278); safety officers' involvement (\$1,127); educators' and trainers' time for assault prevention training (\$5,612); and the costs associated with committee reviews (\$2,502).

McGovern et al. (2000), studied all incidents of physical assaults that resulted in indemnity payments, identified from the Minnesota Department of Labor and Industry (DLI) Workers' Compensation system in 1992. Total costs for 344 nonfatal work-related assaults were estimated at over \$5.8 million (in 1996 dollars). Special education teachers, secondary teachers, and elementary teachers had assault injury rates of 27.2, 9.9, and 8.0 per 100,000 employees, respectively, that averaged \$4,888, \$6,483 \$16,062, per case, respectively (McGovern et al., 2000).

The amount of money spent on work-related violence claims is considerable. Hashemi and Webster (1998) examined nonfatal work-related violence claims with a single large workers' compensation carrier from 51 U.S. jurisdictions between January 1, 1993 and December 31, 1996, and estimated the total cost to be more than \$84,000,000. Miller et al. (1993), estimated that, in 1987, physical injury that occurred to people twelve years of age and older, as a result of rape, robbery, assault, murder, and arson, cost approximately \$10 billion in associated health care; it was also estimated to have lead to \$23 billion in lost productivity and nearly \$145 billion in reduced quality of life.

Psycho-social Costs

Liss and McCaskell (1994) noted additional costs of violence, such as fear of recurrent assault, family disruption, and career change. Lanza (1983), in a study of reported assaults (n=67 nurses, response, 60%) found that, following a physical assault, nurses experienced anxiety, helplessness, irritability, soreness, sadness, depression, shock, disbelief that the assault occurred, and sympathy for the patient who committed the assault. Even in the absence of injury, some assaulted staff continued to experience moderate to severe reactions, not only six weeks post-assault but, also, as long as six months to one year later.

In a study by Caldwell (1992), of 224 clinical mental health staff (55% response rate), it was reported that 61% experienced symptoms of post-traumatic stress disorder (PTSD), which is similar to the symptoms following work-related violence reported in a study of emergency department nurses (n=81) in Kuwait (Atawneh et al., 2003). The results of violence appear to continue, long after the event has occurred. Findorff-Dennis et al. (1999), through a case-study design, found that workers' health and quality of life were affected significantly, and resulted in job changes, chronic pain, changes in functional status, and depression, even four years after the assault.

Bloch and Bloch (1980) described psychological symptoms of neurosis such as fear, anxiety, depression, chronic fatigue, difficulty concentrating, forgetfulness, and diminished self esteem resulting from the extraordinary and continued stress that occurred, with or without trauma, to teachers from inner-city schools in Los Angeles between 1972-1979. Kyriacou and Sutcliffe (1978) studied stress among 257 English school teachers and found approximately one-fifth of teachers rated teaching as very stressful or extremely stressful. Fisher and Kettl (2003), in a study of Pennsylvania teachers found 56% of teachers believed that violence or threat of violence had a direct impact on the quality of education they were able to provide. Teachers noted that, in the past year, they had been afraid of a student (26%) or the parent of a student (14%). However, when teachers perceived good working conditions, high morale, enthusiasm, cooperation, and good communication, they generally experienced less distress (Litt and Turk, 1985).

Williams et al. (1989), studied 90 Texas public school teachers in 1985, with participation by 34% of the teachers. They found females were more fearful than males, college prepared teachers more fearful than other teachers, and the more students a teacher taught, the greater his or her level of fear. Of the 1,000 public school teachers surveyed by Binns and Markow (1999), 75% stated feeling very safe when they were at school; only 1% of public school teachers stated they did not feel safe. Also, 8% of teachers were not *worried* about being physically attacked in or around their schools; less than 1% of teachers were *very worried* about being physically attacked (Binns and Markow, 1999). In response to this fear, between 1993 and 1998, 2% of teachers stated bringing something to school with them for protection, and 19% stated the problem of school violence was a factor in teachers leaving their schools (Binns and Markow, 1999).

Physical Costs

In addition to financial and psycho-social aspects, Simonowitz (1995) described the most obvious consequences of work-related violence: physical injury, partial or total disability, and other physical side effects, such as sleeplessness. In a study of occupational assaults, experienced by Los Angeles County minority health care workers (Sullivan and Yuan, 1995), there were 628 verified assaults that occurred to 530 health care workers between 1986 and 1990; all but three were batteries, two were stabbings, and one was a rape.

Another study involved investigation of assault victims, including 23 nurses and a ward doctor. In particular, intrusive thoughts about the incidents, muscle tenseness, and fatigue were among the most common symptoms reported following an assault (Whittington and Wykes, 1989). Levin et al. (1998), found that work-related violence resulted in short and long-term physical, personal, emotional, and professional effects. Changes in job performance and morale, chronic pain, muscle tension, loss of sleep, nightmares, and flashbacks were among those symptoms reported, in addition to physical consequences of bone fractures.

Bloch (1978) described the physical and psychological effects of psychological stress and physical trauma on 253 teachers from Los Angeles inner-city schools between 1971 and 1976. All were referred to the author for psychiatric evaluation, resulting in identification of a pattern of symptoms in these teachers similar to combat neurosis. Of these teachers, 28% had sustained actual physical assault on campus, such as lacerations, bruises, head injuries, seizures and deafness (Bloch, 1978). Those attacked without provocation or those who did not know their assailants experienced the greatest difficulties. Other physical symptoms included dermatitis, migraine headaches, gastrointestinal disorders, heart palpitations, and hypertension (Bloch and Bloch, 1980).

Duhart (2001) reported 12% of all victims of work-related violence sustained injuries from the incident, and 26% of injured victims received medical treatment from a medical office, clinic, or hospital, according to the National Crime Victimization Survey 1993-1999. Based on a review of Bureau of Labor Statistics data from 1993, Toscano (1996) reported that the nature of nonfatal assault injuries most frequently involved sprains/strains (23%) or bruises/contusions (20%).

Limitations of Previous Research

There are a number of limitations from previous studies that have been conducted. The definition of assault is not always specified or graded, and the majority of studies are descriptive and not comprehensive population-based efforts; many include only case-series data. While these studies provide some limited information on demographics of teachers who experienced violence, including perceptions and attitudes about the assaults as well as demographics and diagnoses of perpetrators, and information on the locations of the assaults, there have been only limited efforts to investigate the potential risk factors within a population. While descriptive studies enable identification of potential risk factors, it is not possible to determine specific risk factors without a comparison group; exposures must be measured for both cases and controls. With the exceptions of the study by Lee et al. (1999), the comprehensive effort by Gerberich et al. (2002), involving nurses, and the study of California worksites by Schaffer et al., (2002), the literature addressing the incidence of nonfatal assaults and potential risk or protective factors had been primarily limited to cross-sectional study designs. These deficiencies in the above studies limit our understanding of this major occupational hazard and the ability to develop effective prevention and control strategies.

The U.S. Departments of Education and Justice (Kaufman et al., 2001) stated that, "...effective programs and policies can only be built on foundations supported by accurate information about the nature, extent, and scope of the problems being addressed." Prior to the current study, the literature had been deficient in such information.

In summary, there was a major need for a comprehensive analytic effort on the relation between exposures to teachers and work-related assault injuries that would enable the identification of specific risk factors. This occupational group had been relatively understudied (Fisher and Kettl, 2003), despite their apparent high risk. Without such a comprehensive effort, the development of appropriate and efficacious prevention and control strategies cannot be initiated.

SPECIFIC AIMS

The primary aims of this effort were to:

1) determine the magnitude of the violence problem and relevant consequences of both physical assault and non-physical violence and

2) examine the relation between work-related physical assault and:

a. *Characteristics/exposures – teachers:* including: education/training; work experience; job type; workload; number of hours worked per day/week; numbers of hours of student contact; illness/injury history including prior work- and non-work-related assault injuries; and demographics (e.g., birthdate/age, gender, race/ethnicity, marital status, socioeconomic status, physical size/body mass, work experience, job title, grade and subject taught).

b. *Characteristics of others in the environment* (e.g., other teachers, staff, students, and visitors) such as: numbers/types; history of violent behavior; other relevant behaviors; and demographics (e.g., age, gender, race/ethnicity).

c. *Environmental situations/exposures* including: types/levels/sizes/locations of schools and area socioeconomic status; physical design/attributes (openness, lighting, barriers, room configurations); administration/management factors including tolerance of violence/relevant policies and protocols; support for employees; employee assistance/resources; support/resources for students; and presence of security systems/personnel (e.g., access control, security guards, video monitors, use of metal detectors, emergency alarms, etc.).

METHODS

Overview

This epidemiological study examined the population of all licensed educators who worked in the state of Minnesota as of 2003. This population was selected because it is one of the few occupations known to be at risk for which there is an available comprehensive database (with contact addresses) for selection of subjects. A pilot study of 300 educators was first conducted to test the specially developed instruments and specific methods incorporated. For the comprehensive study, a screening survey was sent to 26,000 licensed educators in order to establish eligibility (See **Appendix A**, and **Figure 1.**). Subsequently, eligible educators were mailed a survey instrument sent to identify their experience with work-related violence during the past year. Subsequently, a nested case-control design was used to examine the relation between potential risk factors and work-related PA. Controls were sampled at a ratio of 3:1 per case. A specially designed questionnaire was then sent to the cases and selected controls to obtain data on work-related exposures, including the characteristics of educators and significant others in the work environment. Cases were questioned about their exposures prior to and during the incident. Controls were questioned about their exposures on a randomly selected time from the study period to provide the person-time exposure information. This control selection procedure yielded a random sample of the person-time for the cohort; therefore, calculated odds ratios estimated rate ratios for the effects of exposures on the rate of work-related violence.

Univariate analysis was employed first, to describe the characteristics of individual exposures, followed by the use of basic two by two tables or cross-tabulations to calculate the rate ratios (relative prevalence of exposure among cases/relative prevalence of exposure among controls) and confidence intervals to examine if individual exposures were potential risk factors or confounders to other exposures of interest. Potential bias was controlled by inversely weighting observed responses by probabilities of response, estimated as a function of characteristics available from the licensing database (Horvitz and Thompson, 1952); these probabilities were age, gender, and home address (metropolitan versus non-metropolitan area). To account for unknown eligibility among non-respondents, probability of eligibility was estimated from these same factors (Mongin, 2001). The ultimate goal of the data analyses was to estimate the impact of the above factors on work-related violence, controlling for important confounding factors. Selection of confounders for multiple logistic regression was based on DAGS, identified from the overall study causal model, following the methods described by Greenland et al. (1999). Confidence intervals for event rate estimates and regression coefficients were calculated by the bootstrap method (Efron and Tibshirani, 1993). Key items (including self-reported injury history and exposure information validity) were validated through sub-studies.

Definitions

In this study, work-related violence was defined as the intentional use of physical force or emotional abuse, against an employee, that resulted in physical or emotional injury and consequences. This included physical assault (PA) and non-physical violence (NPV). Work-related events included any activities associated with the educator's job or events that occurred in his/her work environment; work-related travel was included. PA occurred when educators were hit, slapped, kicked, pushed, choked, grabbed, sexually assaulted, or otherwise subjected to physical contact intended to injure or harm them. NPV included threats, sexual harassment, verbal abuse, and bullying. Threat was defined as when someone used words, gestures, or actions with the intent of intimidating, frightening, or harming them (physically or otherwise). Sexual harassment occurred when educators experienced any type of unwelcome sexual behavior (words or actions) that created a hostile work environment. Verbal abuse occurred when another person yelled or swore at the educator, called the educator names, or used other words intended to control or hurt. Bullying was defined as repeated acts of intimidation or coercion.

Study Population

Study Cohort

This study examined the population of licensed educators in the state of Minnesota as of 2003, excluding lifetime licensees (n=116,661). This population was selected because it is one of the few professions at risk for which there is an available comprehensive database (with contact addresses) for selection of subjects. Since licensing is required for Minnesota educators, the study population was expected to be a dynamic cohort and stable through time. A random sample of 26,000 educators was selected from this group of licensees.

Cases

Cases were identified through responses to the initial comprehensive survey instrument; they were defined as those who reported being physically assaulted and also worked as educators in Kindergarten-Grade 12 schools in Minnesota during the previous 12 months (n=372). Individuals who reported more than one event were only included as a case once, based on the most remote event.

Controls

Controls were persons who did not report being physically assaulted, but worked as educators in Minnesota during the 12-month study period (n=1116). For each case, three controls were sampled from the population at risk during the study period. Each selected control was randomly assigned a month during the study period to provide the exposure information as the person-time exposure. Individuals were eligible to be a control more than once within the study period.

Data Collection Instruments

The Phase I, Comprehensive Survey data collection instrument included the following: 1) whether or not the educator worked in a Kindergarten-12th grade school in Minnesota in the previous 12 months, and during which months; 2) demographic information such as race, years of experience, year of graduation, training; and 3) number of relevant work-related violence events during the study period. This instrument was specially designed to enable the participants to provide information about each event, including date(s) of the event(s), description of the perpetrator(s) involved, surrounding circumstances and activities at the time of the event(s), location of the event(s), type of injury(ies)/diagnosis(es) and anatomical location, relevant length of restricted activities, lost work time and medical treatment sought or self-administered). (See **Appendix B.**)

The Phase II Case-Control specially designed data collection instrument enabled investigation of exposures that could be associated with work-related violence events, either as risk or protective factors. Cases were questioned about their exposures prior to and during the incident, while controls were questioned about their exposures for a randomly selected month, during the study period, to provide the person-time exposure information for the rate ratio calculations. Both cases and the controls were questioned about: personal information (including demographics; numbers of hours worked per week; numbers of hours of student contact; workload, shifts worked; assault management training; prior work and non-work related assault injuries); environmental exposures (including grade taught, primary professional activity, numbers and types of professionals working in the immediate environment, protocols for patient/visitor management, availability of security systems, types of security systems, established procedures for assault intervention, physical environment including lighting, use of specific barriers, and room configurations, level of support by administration and colleagues, and level of tolerance for harassment and abuse); and others (other workers and patients) in the work environment (including demographics, student impairment status). These data were, then, used to compare exposures between cases and controls that enabled identification of specific risk factors for the work-related violence events. (See **Appendix C.**)

Conceptual Model

An overall conceptual model for the occurrence of work-related violence events, based on previous knowledge, is presented in **Figure 2**. This model was based on the epidemiological

model of human damage involving the dynamic interactions of a host, agent(s) and vehicles (or vectors) within the environment: the host is a person/individual; the agents of injury are various forms of energy, including mechanical energy which accounts for the majority of physical injury events (Gibson, 1961); the vehicle refers to any element in the environment that conveys the agents (in the case of assaults among teachers, the vehicle involves another person who may transmit the energy via the use of extremities to hit or kick or, possibly, by using a knife or gun that facilitates transmission of the energy (Haddon et al., 1964; Robertson, 1984). The underlying theories of Bandura (1973), Messner (1988), Dollard et al. (1939), and Blue and Griffith (1995), among others, as well as those summarized by Simonowitz (1996), are inherent in this model. A more comprehensive causal model is presented in **Figure 3**, and served as the basis for developing DAGs for the relevant exposures of interest, following the methods described by Greenland et al. (1999). This comprehensive model was used to define items to be included in the questionnaires and to guide analyses of the data.

Bias Evaluation

Information Bias

An important consideration in any epidemiologic study is the assessment of measurement error. Measurement error is thought by methodologists to be one of the most serious threats to the validity of epidemiologic study results because it can result in a large amount of bias (Copeland et al., 1977; Dosemeci et al., 1990; Gilbert, 1990; Flegal et al., 1991; Wacholder et al., 1991). It is anticipated that there is a potential for measurement error in the reporting of both work-related violence events and exposures; this potential problem was addressed in several ways.

First, errors in reporting injury events and relevant exposures were aggressively minimized by contacting educators for any responses that appeared unclear or missing. Second, a validation sub-study to estimate the degree of measurement error due to self-reporting of physical injury consequences was conducted. Finally, sensitivity analyses were performed to assess the likely magnitude of bias due to self-reporting of exposures. While it is not technically possible to fully "correct" risk estimates for bias due to measurement error (Greenland and Kleinbaum, 1983), using methods similar to those of Greenland and Kleinbaum, (1983), and Kleinbaum et al. (1982), the sensitivity analyses enables a "correction" for measurement error in the sense that upper and lower bounds for risk estimates, under different plausible scenarios for measurement error, can be obtained.

Validation procedures were conducted for self-reported PA injury occurrences through review of health care records (See **Appendix D.**). It is important to evaluate the potential error in injury self-reporting, so that the extent of bias due to this type of error can be assessed. To accomplish this validation effort, 150 participants were contacted for the names and address of their health care provider(s), whether or not they were injured. Each person was sent a consent form that enabled release of the injury information to the study staff; a stamped, pre-addressed return envelope was enclosed. Subsequently, each identified health care provider/source was sent a letter along with the signed consent form and a one-page questionnaire asking about any health care contacts by the person for injuries during the specified study period; additionally, six-month periods prior to, and after, the respective study period were included to optimize capture of potential treatment should the recall period have been compromised by telescoping, etc. This procedure had been used successfully in other studies previously conducted by the investigators (Gerberich et al., 1983; Gerberich et al., 1987; Gerberich et al., 2002).

Exposure self-reporting may introduce bias in the form of deficient recall of events. By limiting the time period to one month within the preceding year, it was anticipated that this bias was minimized. This approach has been successful in other studies of assaults conducted by some of the same investigators (Lee et al., 1999; Gerberich et al., 2002). A specific validation effort was conducted to identify potential bias that could be associated with certain exposure variables. To accomplish this, a cover letter with a brief survey, and stamped, return envelope was sent to the Principals at 150 of the subjects' workplaces to request information about several important exposures during the study period (e.g., type of school; written violence prevention policies; assault deterrents; and student census, etc., for the relevant time period). Participants had listed the name of their school on their survey; however, the letter to the principal did not

disclose that an educator from their school had participated in our study. From comparisons of the information provided by the subjects, with the workplace records, sensitivity analyses were performed to enable determinations about the magnitude and direction of the bias.

Selection Bias

The case-control study design can be viewed as an efficient version of a cohort study. The efficiency of this design results from studying only a sample of the cohort at risk (Greenland, 1994). With the increased efficiency, however, comes the potential for bias due to the way in which subjects are sampled into the study (i.e., selection bias). Selection bias can occur if: 1) the cases in the study are a biased sample of the cases in the study population during the study period; or 2) the controls in the study are a biased sample of the non-cases in the study population during the study period. In this study, we utilized variables collected routinely by the licensing agency to determine potential selection bias among subjects, following the method described by Mongin (2001). In addition, all cohort subjects, who did not respond to the initial comprehensive interview or the case-control interview, were sent an abbreviated questionnaire designed to allow inferences about the impact of selection bias. As with bias due to measurement error, it is not possible to fully correct effect estimates for selection bias. However, sensitivity analyses were performed to enable upper and lower bound risk estimates under different plausible scenarios for biased selection (Rothman and Greenland, 1998).

RESULTS

Phase 1 – Comprehensive Study

From the *comprehensive study* ($n = 6,469$), there was an overall response rate of 84%, with 78% completing the full survey instrument. Characteristics of the 4,731 study participants who returned a comprehensive survey revealed that 77% were women, and the average age (s.d.) was 45.7 years (10.6). The highest level of education was most commonly a Master's Degree (53.5%), followed by a Bachelor's Degree (37.9%) (Refer to **Table 1**). Males (compared with females) appeared to be at decreased risk of PA (OR 0.78; 95% CI 0.61-1.00) and NPV (OR 0.88; 95% CI 0.77-1.00). Also, as the age of the educator increased (per year), the odds of NPV (OR 0.993; 95% CI 0.988-0.999) decreased. However, the same effect was not seen for PA (OR 0.997; 95% CI 0.987-1.006).

Most frequently, educators reported the schools in which they worked were primarily public schools (87%). Most educators worked full-time (nearly 80%). Most educators described themselves as "classroom teachers" (68%). Approximately 4% to 5% of educators reported working most often with each grade between kindergarten and tenth grade; approximately 2.5% of educators reported working primarily with eleventh and twelfth graders, however, 35% of educators reported working with more than one grade level. Topics taught varied, but over 24% of educators worked primarily in elementary education. Approximately 38% reported typical class sizes between 25 and less than 45 students; 35% reported class sizes of 10 to less than 25 students (Refer to **Table 1**.)

Based on data from the *comprehensive study* (**Table 2**), the adjusted PA rate for educators in Minnesota, based on incurring at least one assault, was 8.3 per 100 educators per year. For NPV (threats, sexual harassment, verbal abuse and/or bullying), the adjusted rate was 38.4 per 100 educators per year.

In **Table 3**, reporting is based on PA (specific events or ongoing events) and NPV (threats, sexual harassment, verbal assault events, and/or bullying). It is shown that the majority (over 95%) of physical violence events was perpetrated by students, while perpetrators of non-physical violence were more varied and included students (75%), parent/visitor/trespasser (20%), and school employees (17%). The majority of perpetrators associated with PA were described as impaired because of disability/developmental delay (78%). Approximately 16% were described as "not impaired." In contrast, perpetrators associated with NPV were less frequently perceived as impaired because of disability or development delay (35%) or under the influence of alcohol, aerosols, or drugs (prescribed or non-prescribed) (5%), while over 56% were described as "not impaired." Males were the primary perpetrators for physical (77%) and non-physical (77%) violence. Physical violence was most often perpetrated by those less than age 13 (71%), while non-physical violence was distributed among those less than 13 (30%), age 13 to less than 16 (34%), 16 to 18 (23%), and adults (32%). (Note: educators could choose multiple categories, therefore the total may be greater than 100%).

Reporting for PA is based on specific (one-time) events or ongoing events. By location (not shown), the PA specific events, occurred primarily in: classrooms (65%) and hallways (22%). Anatomically, specific PA events primarily involved: arm/elbow/wrist (41%); or leg (31%); also, involved, were: face (9%); hand/finger/thumb (8%); back (5%); and head/skull/brain (4%). For ongoing events, the proportions differed respectively: 72%; 66%; 41%; 41%; 18%; and 11%. The resulting types of physical injuries (either specific or ongoing events) reported most frequently were bruises/contusions, temporary discolorations/slap marks, cuts/lacerations/ scratches, or abrasions.

The "assault instruments" used in the PA (not shown), for specific events, were hands/arms (81%); feet/legs (52%); and teeth (14%). For ongoing events, there were some differences observed, respectively: 98%; 89%; and 44%.

Very small proportions of either the PA (<1%) or NPV (<1%) cases were hospitalized. Respective proportions of those who experienced PA or NPV reported self-treatment (11%, PA specific events; 16%, PA ongoing events; and 8%, NPV) of their injuries while approximately 9% (PA specific events), 26% (PA ongoing events) and 8% (NPV) sought care from health care

providers; large proportions reported having no treatment (e.g., 78%, PA specific events; 62%, PA ongoing events; 82%, NPV).

The most commonly reported consequences of both physical and NPV were frustration, anger, fear/anxiety/stress, sadness, fatigue, difficulty sleeping, and irritability, with much greater proportions reported for NPV for each of the consequences (**Table 4**). Approximately 8% of educators reported changes in their work status as a result of PA; however, 16% among those who reported NPV identified changes, including 4% who quit as a result.

Phase 2 – Case-Control Study

Because the majority of PA was perpetrated by students (95%), analyses for the case-control study incorporated only those cases (n = 290). Characteristics of, and pertinent exposures for, the 290 cases and the 867 controls are shown in **Table 5**. Cases, compared with controls included, in general: similar distributions by gender and age. A larger percentage of controls had Bachelor's degrees (38% versus 31%), while more cases had Master's degrees than controls (56% versus 52%). Both groups (cases and controls, respectively) worked primarily in public schools (87% and 82%), though more controls worked in private non-parochial schools (2% and <1%). The majority of educators worked full-time (cases: 87% and controls: 80%). Cases most frequently worked in special education (40% and 13%). Grade level taught typically involved higher grade levels for controls, compared to cases. Topics taught also varied between the two groups. Cases, compared to controls, most frequently taught special education (27% and 11%), while controls most frequently identified their topic taught as "elementary education" (cases, 20%; controls 25%). Class sizes of less than 10 were most frequently identified by cases (28%) compared with controls (13%), while controls typically had larger classes of 25 to less than 45 students (cases, 21%; controls, 29%).

Educator Characteristics (Results reported for ORs and 95% CIs)

Several personal exposures were investigated. Risk of PA was decreased for educators working 8 to less than 15 years (0.6; 0.4-0.9) and 25 years or more (0.4; 0.2-0.8), compared to working less than 8 years. Risks decreased among those having >8 versus <8 years of experience (0.59; 0.40-0.87).

Educators reported their *primary professional activity* and, compared to classroom teachers, there was an increased risk of PA for school social workers (7.3; 2.8-19.2) and special education educators (6.1; 4.2-8.8). When describing the *primary topic taught*, special education teachers had an increased risk of PA (3.7; 2.5-5.4), as did speech pathologists (2.3; 1.1-5.1). Those who reported working part-time, compared to full-time contract educators, had decreased risks (0.4; 0.2-0.7).

Educators who reported being trained about using appropriate restraint techniques had an increased risk of assault (1.7; 1.1-2.7). Total hours spent in training also increased risk of assault for some groups. Specifically, compared to no hours in training, those who spent 5 to <10 hours in violence prevention training in the past 12 months had an increased risk (1.9; 1.0-3.5), as did those with 10 to less than 15 hours in training (2.9; 1.1-7.7).

Overall, the highest education level for educators also appeared to be related to risk of violence. Compared to those with Bachelor's Degrees, risk increased for those with Master's Degrees (1.4; 1.1-1.9); Education Specialist Degree (1.9; 1.1-3.2); Doctorate Degree (5.1; 1.6-16.4).

Personal history of violence, both physical and non-physical, increased the risk of PA. Compared to no history of work-related PA those with a history of 1 to 3 events had an increased risk (15.0; 9.7-23.12); 4-10 times (21.5; 10.5-44.2), and more than 10 times (43.7; 17.1-111.3). Risk also increased for those with a history of violent events not related to work.

School and Student Characteristics (Results reported for ORs and 95% CIs)

Characteristics of the schools and students were also analyzed. Educators working in public magnet, compared to public, schools had an increased risk of PA (3.4; 1.1-10.7); however, those working in private schools had a decreased risk of PA (0.1; 0.1-0.4). Compared with suburban schools, those working in urban schools had increased risks (2.0; 1.4-2.8). School size was also associated with PA. Increased risks were identified for educators working in schools with less

than 50 or 50 to 200 students, compared with 501 to 1000 students (4.3; 1.7-11.1 and 1.9; 1.0-3.5). Schools with more than 1000 students had a decreased risk (0.5; 0.3-0.8).

Compared to students less than 10 years of age, educators working with children aged 10 to less than 13, and 16 to less than 18 had decreased risks (0.6; 0.4-1.0 and 0.4; 0.3-0.8, respectively). Similarly, assault risk decreased for working with ages 10 or older versus less than 10 (0.6; 0.4-0.8). When the assigned students were primarily female, or if the gender appeared equivalent within the class, risk was decreased (0.3; 0.1-0.8 and 0.6; 0.4-0.9). Relevant to race, if the perception of race of the majority of their students was viewed as different from that of their own, PA risk was increased (2.5; 1.6-3.9). Risk was also increased when the educator was unsure if the perpetrator's race was different from the educator (4.0; 1.4-11.9). Also, working with students perceived to be impaired due to disability or developmental delay was associated with increased risk of PA (2.7; 1.2-5.7). Relevant to parental involvement, assault risks (ORs; 95% CIs) decreased with increased parental involvement: Poor (2.77; 1.67-4.59), Fair (1.34; 0.85-2.11), Very Good (0.37; 0.21-0.66), Outstanding (0.23; 0.06-0.95), compared with Good involvement.

Work Environment Characteristics (Results reported for ORs and 95% CIs)

Compared to zero times, respective risks for PA increased for educators working in environments where they witnessed students involved in: PA 1-3 (2.9; 2.0-4.4), 4-10 (6.6; 3.7-11.7), and 10+ (15.7; 7.8-31.3) times; threats 1-3 (1.5; 1.0-2.3), 4-10 (4.1; 2.4-6.9), and 10+ times (8.3; 4.6-14.9); sexual harassment 1-3 (1.9; 1.3-2.9), 4-10 (3.3; 1.7-6.4), and 10+ times (10.0; 4.5-22.2); verbal abuse, 10+ times (3.9; 2.3-6.6); and bullying, 10+ times (3.2; 1.9-5.5). These trends were also observed when educators were made aware of students involved in these activities, even if the educator did not directly witness the events. Compared to zero times, respective risks (ORs; 95% CIs) for PA increased for educators working in environments where they were made aware of students involved in: PA 1-3 (1.8; 1.2-2.8), 4-10 (3.6; 2.1-6.2), and 10+ (5.5; 2.9-10.4) times; threats 1-3 (1.6; 1.1-2.5), 4-10 (3.1; 1.8-5.2), and 10+ times (6.4; 3.5-11.5); sexual harassment 1-3 (1.3; 0.9-1.9), 4-10 (4.9; 2.6-9.1), and 10+ times (6.4; 2.6-15.3); verbal abuse, 1-3 (1.6; 1.0-2.5), 4-10 (2.2; 1.3-3.8), and 10+ times (4.8; 2.8-8.1); and bullying, 1-3 (0.9; 0.6-1.4), 4-10 (1.8; 1.1-3.0), and 10+ times (3.0; 1.8-5.0).

These trends also continued if educators reporting witnessing person(s) other than students involved in violent events. Compared to zero times, respective risks for PA increased for educators working in environments where they witnessed: PA 1-3 (3.1; 1.7-5.9), 4 times or more (11.6; 1.8-75.6); threats 1-3 (2.8; 1.8-4.3), more than 10 times (9.3; 2.0-43.8); sexual harassment 4 times or more (3.9; 1.2-13.1); verbal abuse, 4-10 times (3.0; 1.5-5.9), more than 10 times (5.7; 2.2-14.2); and bullying, more than 10 times (8.2; 2.5-27.2). If the educator did not witness the event, but was made aware of the event by anyone other than a student, risk was also increased. Compared to zero times, respective risks for PA increased for educators working in environments where they were made aware of any person(s) other than students involved in: PA 1-3 times (1.9; 1.2-3.0); threats 1-3 times (1.7; 1.2-2.6), 4-10 times (3.0; 1.3-6.9), or 10+ times (5.1; 1.3-19.8); sexual harassment 1-3 times (1.8; 1.1-2.9); verbal abuse, 1-3 times (2.3; 1.6-3.3) and 10+ times (7.5; 3.2-17.5); and bullying, 4-10 times (2.1; 1.0-4.3), or more than 10 times (3.1; 1.1-9.0).

In addition to these perceptions, educators were also asked about the frequency of several characteristics in the work environment. Risk of PA was increased or decreased for the educators who reported the following characteristics (reference: "sometimes"): inadequate building safety: "always" (6.3; 2.0-20.0), "frequently" (2.3; 1.1-4.6), "never" (0.6; 0.4-0.9); inadequate coworker support "never" (0.6; 0.4-0.9); teaching unmotivated students "always" (2.2; 1.2-3.9), or "frequently" (1.5; 1.1-2.2); student behavior management "always" (2.5; 1.5-4.0), or "frequently" (2.2; 1.5-3.3); formal discipline of students "frequently" (1.6; 1.1-2.3); witnessing or being made aware of any violent events "always" (4.9; 2.1-11.6), "frequently" (2.3; 1.4-3.7), "infrequently" (0.5; 0.3-0.8), or "never" (0.2; 0.1-0.4).

How educators described their satisfaction with components of their typical work environment also was related to risk of PA. Compared to "satisfied," educators' risk was increased or decreased for the following characteristics: level of satisfaction with cleanliness of the school "very satisfied" (0.7; 0.4-1.0); satisfaction with temperature "somewhat satisfied" (0.6; 0.4-1.0); satisfaction with lighting "very satisfied" (0.6; 0.4-0.9); satisfaction with spaciousness of main

entrance "somewhat dissatisfied" (1.8; 1.1-3.0); satisfaction with color scheme/artwork "very dissatisfied" (2.1; 1.2-3.8); satisfaction with building safety/security "very dissatisfied" (2.0; 1.1-3.6); and satisfaction with school learning climate "very satisfied" (0.6; 0.4-1.0).

Educators were also asked about their level of agreement about their expectations of work-related violence. With a reference of "strongly disagree," educators had increased risks of violence if they felt coworkers expected assault was a possible consequence of the job: "strongly agree" (8.0; 4.1-15.6); "agree" (3.8; 2.5-5.8); or "disagree" (1.7; 1.1-2.7). When the educator was asked about their agreement with the statement, "I expected that assault was a possible consequence of the job," risk of PA was increased (compared to "strongly disagree") for those who answered "strongly agree" (9.1; 4.6-18.3), "agree" (5.4; 3.4-8.5), or "disagree" (2.2; 1.3-3.6).

In addition to these expectations about violence, educators were also asked about measures taken regarding these risks. Compared to those who "agreed," risk increased for those who "strongly agreed" they took corrective/preventive measures against assault in the workplace (1.5; 1.0-2.3); however, risk decreased for those who "disagreed" (0.4; 0.2-0.6), or "strongly disagreed" (0.1; 0.04-0.43).

Risks increased: for working in soft versus brightly lit areas (1.4; 1.1-2.0), and where barriers blocked vision (1.5; 1.1-2.2). Decreased risk occurred in environments with easily accessible exits (0.3; 0.2-0.7). Educators who reported that assault deterrents "decreased my feeling of safety," had increased risk of violence (5.8; 2.8-11.9).

When educators regarded parental/family/guardian involvement as "Very good," the risk of assault was decreased (0.4; 0.2-0.7). However, when it was viewed as "poor," the risk increased (2.8; 1.7-4.6).

Increased risks were also identified when educators believed their schools did not have up-to-date technology, (1.4; 1.0-1.9), adequate sports equipment and facilities (1.9; 1.3-2.7), or musical facilities (1.9; 1.3-2.8). If educators noted a lack of sufficient economic resources for educators, risk was increased (1.6; 1.1-2.3). Risk also increased if the educator reported providing out of pocket expenses for educational purposes (1.9; 1.2-3.0). Compared to educators' estimates that less than 25% of students received free lunches, increased risks were shown for those reporting that between 25% and 50% (1.6; 1.0-2.4) and more than 75% (3.7; 2.1-6.7) of students received free lunches.

Policies related to violence had some relation to PA. Educators who reported written policies about confidentiality in reporting violent incidents had decreased risks of violence (0.7; 0.4,-1.0). Educators who believed a zero tolerance policy was necessary to reduce violent events in their work environment had decreased risk of assault (0.6; 0.4-0.9).

Sensitivity Analyses

Sensitivity analyses were conducted to assess the magnitude and direction of bias. As an example, current study results suggested that certain types of training were associated with increased risk of physical assault. The purpose of the sensitivity analysis was to determine how these results could be affected by the presence of an unmeasured confounder, such as a factor that would indicate a higher risk environment where training related to violence might be more prevalent. Using the methods described by Rothman and Greenland (1998), analyses were conducted in which the prevalence of an unmeasured confounder in the group of educators who had training about the use of appropriate restraining techniques was equal to, less than, or greater than the prevalence of the confounder in the group of educators who had not had training. The sensitivity analysis demonstrated that if the odds ratio for the association between the unmeasured confounder and work-related assault is greater than one and the prevalence of the confounder is greater among educators with training than among those without, the odds of physical assault associated with this type of training decrease. For example, if the prevalence of the unmeasured confounder was 0.7 among trained educators, 0.3 among untrained educators, and the odds ratio for the unmeasured confounder was equal to 5, then the odds ratio for training would decrease, from 1.7 to 1.0. However, this sensitivity analyses considered only the value of the point estimate and not the precision of its estimation. Therefore, the effect of training about the use of appropriate restraining techniques might be statistically removed by controlling for a confounder with less strength.

Validation Studies

Health Care Provider Validity Sub-Study Results

A sample of 150 educators was selected for the health care provider validity sub-study, to validate data about reported PA events. Both educators who indicated treatment, and those who did not, were included in this sub-study to evaluate under- or over-reporting of injury treatment. The sample of 150 educators included the following: 50 educators who indicated that they sought professional health-care treatment following an event; 50 educators who had at least one event but did not seek treatment from a health care professional; and 50 educators who indicated that they did not experience a physical assault.

If educators did not receive health care during the time period specified, they were asked to complete release-of-information forms to be sent to health care providers, who they *would have seen*, had they needed treatment. (This was done to account for potential errors if the educator remembered the treatment occurring in a different time period, or to verify if treatment was documented by the health care provider, when no treatment was indicated by the educator on the comprehensive survey).

A cover letter, including informed consent, a stamped-return envelope, three forms requesting the name and address of their health care providers, during a specific time period, and samples of the letter and one-page form to be completed by the health care provider, were included in the mailing for this sub-study (**Appendix D**). Directions were included for the participants to make additional photocopies of release-of-information forms or to call for additional copies, as needed.

Of the 150 educators, 30% (n=46: 33 cases; 13 controls) responded to the request in some way. Among these, 25 educators (17%) completed 36 release-of-information forms for their health care providers (17 cases for 22 providers and 8 controls for 14 providers); 7% (n=10: 9 cases; 1 control) refused participation in this sub-study, and 7% of educators (n=11: 7 cases; 4 controls) had inadequate responses, either completing their own sample forms indicating "no treatment" (n=4) or returning consent forms indicating "no treatment" n=6. Telephone call attempts were made to these persons to clarify their responses.

Of the 36 health care providers contacted, 32 responded (89% response) with medical record information. Of these, 13 health care providers confirmed "no treatment" for controls; all 7 cases who indicated no treatment had this confirmed by their health care providers (negative predictive value was 100%). Four cases who were treated had health care treatment confirmed. However, eight discrepancies existed when an educator reported treatment, but the responding health care provider indicated no treatment was sought (positive predictive value was 33%). Most often these teachers had experienced ongoing/multiple events (7 of 8), typically involving minor injuries, where perpetrators were special education students (6 of 8) or students with disabilities.

Employer Validity Sub-study Results

This sub-study was conducted to compare responses between educators and employers, regarding their work environments, including written work-related violence prevention policies. Several exposures were examined, including the presence of written violence prevention policies and enforcement, and assault deterrents (See **Appendix D**).

Educators identified the schools in which they worked the most time during the study period. For this sub-study, principals were contacted from a sample of these schools. Educators were not identified to their principals; no connection to any educator in their respective schools was noted in order to protect educators' privacy.

A total of 150 educators were selected for this sub-study (75 cases and 75 controls). Principals from these schools were identified and were sent letters and a brief survey. There were 144 unique schools that were surveyed pertinent to a one-month period of time, which corresponded to the specific month described by the respective educators in their case-control surveys; six schools were asked about policies for two separate months because the school had two educators selected for this validation sub-study. A subset of the questions, pertinent to policies and assault deterrents to which the educators had already responded through the case-control survey, was subsequently posed to the principals. (Refer to **Appendix D**.)

A total of 52 principals responded to the survey (35% response) and, of these, 50 had sufficient responses (33%). Of the 150 principals contacted for this sub-study, and for which there were data reported by the corresponding educator, the percent agreement regarding assault deterrents varied from 45% agreement about the unavailability of an escort/bodyguard, to 100% agreement about the availability of telephones and video monitors in classrooms. There were no consistent differences between cases and controls in terms of percent agreement between the educators' responses and those of the school principals. The largest difference occurred with respect to the percent agreement about enforcement of policies (71% and 33% for cases and controls, respectively; $\chi^2=3.2$, $p = 0.07$).

DISCUSSION

This is the first major study to document the magnitude and consequences of work-related violence within the population of Minnesota educators, and to identify specific risk factors for PA, using a nested case-control design. The high response rate was accomplished through the implementation of rigorous follow-up methods. Of particular importance, is the evidence of high rates of both PA (8.3) and NPV (38.4) per 100 educators per year; however, these rates should be considered conservative, given that they are based on persons incurring at least one work-related PA or NPV event per year when, in fact, there was evidence of occurrence of multiple events among some of the educators.

Despite lack of comparability with other studies, due to different study methods, populations studied, and definitions of violence, some findings were similar with respect to occupational physical violence. Males were less likely than females to experience violence, which is contrary to previous research with other study populations (Carmel and Hunter, 1989; Gerberich, et al., 2002; Hanson and Balk, 1992; Liss and McCaskell, 1994 a; Peek-Asa et al., 1997) and may relate to differences in exposures; however, in some studies pertinent to teachers, males were more frequently identified as perpetrators (Flaherty, 2001; Kettl, 2001; and Duhart, 2001). Younger age was associated with an increased likelihood of incurring violence in the occupational environment, consistent with some previous research (Gerberich, et al., 2002; Gerberich, et al., 2004; Toscano, 1996; LaMar et al., 1998; Riopelle et al., 2000).

Students were reported most frequently as the perpetrators of physical and non-physical violence, consistent with Binns and Markow (1999), and the majority of students were perceived to be impaired, primarily due to disability or developmental delay. Impairment of the perpetrator, due to disease/illness, medication, or drugs/alcohol, has also been identified previously (Helmuth, 1994; Murray and Snyder, 1991; Drummond et al., 1989; Jones, 1985; Lanza, 1983; Aquilina, 1991; Cooper and Mendonca, 1989; Mahoney, 1991). In addition, most of the perpetrators of both physical and non-physical violence were male, and physical violence was most often perpetrated by those under age 13, while non-physical violence perpetrators represented a broader age range and diversity in perpetrators. Risk of violence increased for those educators who perceived the race of the perpetrator was different from his/her own race ("Was the perpetrator of the physical assault of the same race/ethnicity as you?") In a study by Binns and Markow (1999), 20% of 1000 teachers identified race as a major factor in school violence.

In the current study, educators working primarily at urban and public magnet schools, and schools with less than 200 students also appeared to be at increased risk of PA. Those in urban schools were also identified as being at greatest risk by Binns and Markow (1999), Dinkes et al. (2007), and Noelle et al. (2007). Consistent with the current study, public school teachers have also been identified at increased risk, compared with other types of schools, including private (Dinkes et al., 2007; Noelle et al., 2007).

Educators involved in certain professional activities, or in topics taught, appeared to have increased risk of PA; this included special education educators, social workers, and speech pathologists. Additional research is necessary to better understand the specific activities and environments that may lead to this increased risk.

Work-related violence prevention training did not appear protective for this group of educators, which is consistent with a previous study of work-related violence against nurses

(Nachreiner et al., 2005). More detailed information specific to the method and quality of training, or training on specific topics may assist in better understanding the lack of a protective effect.

From analyses of environmental design and other environmental characteristics, an increased risk was demonstrated for working in environments with soft lighting, which is consistent with a previous study on work-related violence against nurses (Gerberich et al., 2005). This is also consistent with a previous case-control study of occupational homicide that identified reduced risks with bright exterior lighting (Loomis et al., 2002).

Witnessing or being made aware of violence in the work environment, regardless of who perpetrated the event, increased the risk of PA, again consistent with findings from the Minnesota Nurses' Study (Gerberich et al., 2002). This may indicate that changes in the overall work climate may be helpful for educators in reducing their personal risk of violence, regardless of whether or not they have been assaulted at work in the past. Previous history of non-work related violent events (physical or non-physical) also was associated with an increased risk of PA.

The physical, emotional, and financial costs of violence to the victim, and society, in general, appear to be important. Adverse consequences of violence reported in the current study are similar to those reported by others (Center for Mental Health Services, 1994; Health Services Advisory Committee, 1987; Miller et al., 1993; Simonowitz, 1995; Liss and McCaskell 1994 b; Lanza, 1983; Caldwell, 1992; Ryan and Poster, 1989). Occupational violence has been associated with diminished efficiency and reduced productivity, increased turnover, absenteeism, counseling costs, decreased staff morale, and reduced quality of life (Center for Mental Health Services, 1994; Health Services Advisory Committee, 1987; Miller et al., 1993). Even in the absence of injury, some assaulted staff experienced moderate to severe reactions for as long as six months to one year. In a study by Caldwell (1992), of 224 clinical mental health staff (55 percent response rate), 61 percent experienced symptoms of posttraumatic stress disorder (PTSD) that were also identified in the current study. Findorff-Dennis et al. (1999), found that the consequences of violence appeared to continue long after the event occurred. Through a case-study design, it was found that workers' health and quality of life were affected significantly and resulted in job changes, chronic pain, changes in functional status, and depression for as long as four years after the assault.

As in a previous study of work-related violence against nurses (Gerberich et al., 2004), this study also found significant effects following violent events, with non-physical violence resulting in more severe outcomes than physical violence. For example, more educators made changes to their work situation (such as transferring to another area or quitting) because of non-physical, compared to physical, violence. This is not to minimize the problem of PA but, rather, to highlight that work-related violence affects not only the victim but, also, the employer, others in the work environment, and significant others outside the work setting. In particular, attention to facilities, departments, student populations, and activities that place these people at risk is of great importance and need to be addressed by employers and relevant safety committees.

Limitations

Limitations include the fact that participants self-reported violence and relevant exposures; thus, there were potential biases: information; misclassification; selection; and confounding. Numerous strategies, implemented to minimize these biases and enhance the overall quality of this study, are identified in the following.

Attempts to minimize information bias included limiting recall of violence events to the previous 12 months and recall of exposures to a one-month period within the preceding year (Gabel and Gerberich, 2002; Gerberich et al., 2004, 2005; Lee et al., 1999) – approaches that have been utilized successfully in previous studies. To further minimize information bias, educators were also followed-up by mail to provide missing information, or clarify ambiguous or unclear information, as necessary; calendars, with relevant holidays, were included in survey mailings. Validation sub-studies, pertinent to environmental exposures and health care treatment were conducted to determine potential measurement error. This included the employer validation sub-study relevant to self-reporting of policies. Potential response bias was controlled by inversely weighting observed responses by probabilities of response, estimated as a function of characteristics available from the licensing database (Horvitz and Thompson, 1952). To account

for unknown eligibility among non-respondents, probability of eligibility was estimated from these same factors (Mongin, 2001). To minimize the effect of confounding, selection of confounders for multiple logistic regression models was based on Directed Acyclic Graphs, derived from an overall causal model, following the methods described by Greenland et al. (1999). Sensitivity analyses, conducted on key exposures of interest (Rothman and Greenland, 1998), from the current case-control study, suggested that the results remained important, even in the presence of strong confounders.

CONCLUSIONS

This study is among the first such comprehensive efforts to identify the magnitude and consequences of the violence problem and relevant risk factors in a major occupational population. As identified, rigorous applications of methods and procedures were incorporated to ensure optimal quality of data collection, analyses, and interpretation. Identification of specific risk factors serves as a basis for the development of efficacious prevention and control efforts. In addition, results of this effort provide unique opportunities for further in-depth investigation of key risk factors and the most appropriate methods for controlling these factors in school settings.

PRESENTATIONS AND PUBLICATIONS

Presentations (students identified with underline):

Presentation: Gerberich SG, Nachreiner NM, Ryan AD, Mongin SJ, Church TR, McGovern PM, Geisser MS, Feda DM, Sage SK, Pinder ED, Watt GD. Environmental Violence and Physical Assault Against Teachers. 2008 National Occupational Injury Research Symposium, Pittsburgh, Pennsylvania, October 21-23, 2008.

Presentation: Pinder ED, Gerberich SG, Alexander BH, Church TR, Hansen J-I, Ryan AD. Burnout: The risk of physical assault in the workplace. 2008 National Occupational Injury Research Symposium, Pittsburgh, Pennsylvania, October 21-23, 2008.

Presentation: Gerberich SG, Nachreiner NM, Ryan AD, Church TR, Mongin SJ, McGovern PM, Geisser MS, Watt GD, Feda DM, Sage SK, Pinder ED. Occupational Violence in the Schools: Impact of Environmental Factors, Epidemiology Section, American Public Health Association, San Diego, California, October 2008.

Presentation: Feda DM, Gerberich SG, Ryan AD, Alexander BH, Nachreiner NM, Church TR, McGovern PM: Impact of written violence policies in educational settings on risk of physical assault against Minnesota educators, American Public Health Association annual meeting, San Diego, California, October 2008.

Presentation: Feda DM, Gerberich SG, Ryan AD, Alexander BH, Nachreiner NM, Church TR, McGovern PM: Impact of assault deterrents in educational environments on risk of physical assault against Minnesota educators, American Public Health Association annual meeting, San Diego, California, October 2008.

Presentation: Sage SK, Gerberich SG, Nachreiner NM, Ryan AD, Church TR, Patricia M. McGovern PM, Mongin SJ, Feda DM: Association Between Per Student Expenditure and Resource Allocation on Educators' Risk of Physical Assault, American Public Health Association annual meeting, San Diego, California, October 2008.

Presentation: Pinder ED, Gerberich SG, Alexander BH, Church TR, Hansen J-I, and Ryan AD: Do different job stressors predict burnout in teachers who were physically assaulted and those who were not? American Public Health Association annual meeting, San Diego, California, October 2008.

Presentation: Nachreiner NM, Gerberich SG, Ryan AD, McGovern PM, Feda DM, Sage SK, Geisser MS, Church TR, Watt GD, Mongin SJ: Occupational Physical Assault and Violence Prevention Training: The Minnesota Educators' Study, American Public Health Association annual meeting, San Diego, California, October 2008.

Presentation: Gerberich SG, Nachreiner NM, Ryan AD, Mongin SJ, Church TR, McGovern PM, Feda DM, Sage SK, Geisser MS, Watt GD.: A Population-Based Study of Occupational Violence in the Schools. International Society for Research on Aggression, Budapest, Hungary, July 2008.

Presentation: Sage SK, Gerberich SG, Nachreiner NM, Ryan AD, Church TR, McGovern PM, Geisser MS, Mongin SJ, Feda DM: Disparities in School Funding, School Resource Allocation, and Risk of Physical Assault Against Educators. International Society for Research on Aggression, Budapest, Hungary, July 2008.

Presentation: Gerberich SG, NM Nachreiner, AD Ryan, TR Church, PM McGovern, MS Geisser, GD Watt, DM Feda, SK Sage, E Pinder. Risk Factors for Occupational Violence Against Educators. Society of Epidemiologic Research, Chicago, Illinois, June 2008.

Presentation: Sage SK, Gerberich SG, Nachreiner NM, Ryan AD, Church TR, McGovern PM, Geisser MS, Mongin SJ, Watt GD, Feda DM, Pinder ED. Impact of Per Student Expenditure

on Educators' Risk of Physical Assault, Society of Epidemiologic Research, Chicago, Illinois, June 2008.

Presentation: Gerberich SG, Nachreiner NM, Ryan AD, Mongin SJ, Church TR, McGovern PM, Geisser MS, Feda DM, Sage SK, Watt GD. Environmental Violence: Impact on Occupational Physical Assault in the Schools. NORA Symposium, University of Minnesota, May 2008.

Presentation: Nachreiner NM, Gerberich SG, Ryan AD, McGovern PM, Geisser MS, Feda DM, Sage SK, Watt GD, Church TR, Mongin SJ. Impact of Violence Prevention Training for Minnesota Educators. NORA Symposium, University of Minnesota, May 2008.

Presentation: Gerberich SG Nachreiner NM, Ryan AD, Mongin SM, Church TR, McGovern PM, Geisser, MS, Feda DM, Sage, SK, Pinder E, Watt GD: Occupational Violence in the Schools - Magnitude and Risk Factors, World Conference on Injury Prevention and Safety Promotion, Merida, Mexico, March 2008.

Presentation: Gerberich SG Nachreiner NM, Ryan AD, Mongin SM, Church TR, McGovern PM, Geisser, MS, Feda DM, Sage, SK, Pinder E, Watt GD: Environmental Violence: Impact on Occupational Physical Assault in the Schools, World Conference on Injury Prevention and Safety Promotion, Merida, Mexico, March 2008.

Presentation: Nachreiner NM, Gerberich SG, Ryan AD, McGovern PM, Geisser MS, Feda DM, Sage SK, Watt GD, Church TR, Mongin SJ. Impact of Violence Prevention Training for Minnesota Educators. 9th World Conference on Injury Prevention and Safety Promotion, Merida, Mexico, March 2008.

Presentation: Nachreiner NM, Gerberich SG, Ryan AD, McGovern PM, Geisser MS, Feda DM, Sage SK, Watt GD, Church TR, Mongin SJ. Impact of Violence Prevention Training for Minnesota Educators. Minnesota Educators' Study 2008 Symposium, Minneapolis, Minnesota, March 2008.

Presentation: Gerberich SG, Nachreiner NM, Ryan AD, McGovern PM, Geisser MS, Feda DM, Sage SK, Watt GD, Church TR, Mongin SJ. Overview of the Results of the Minnesota Educators' Study. Minnesota Educators' Study 2008 Symposium, Minneapolis, Minnesota, March 2008.

Presentation: Sage SK. Review of Research Relevant to Efficacy of Bullying Programs in the Schools. Minnesota Educators' Study 2008 Symposium, Minneapolis, Minnesota, March 2008.

Presentation: Pinder E, Gerberich SG, Alexander BH, Church TR, Hansen J-I, Ryan AS. Teacher Burnout And Its Sources: The Risk Of Physical Assault, Work, Stress and Health 2008, Seventh International Conference on Occupational Stress and Health, Washington, DC, March 2008.

Presentation: Gerberich SG, Nachreiner NM, Ryan AS, Mongin SJ, Church TR, McGovern PM, Geisser, MS, Feda DM, Sage, SK, Pinder E, Watt GD. School Violence: Population-Based Study of Magnitude and Risks for Educators, American Public Health Association, Washington, DC, November 2007.

Presentation: Gerberich SG, Nachreiner NM, Ryan A.D, Church TR, McGovern PM, Geisser MS, Watt GD, Feda DM, Pinder E, Sage SK. Violence in the schools: Teachers at risk. Midwest Center for Occupational Health and Safety Advisory Board Meeting, Minneapolis, Minnesota June 2007.

Invited Presentation: Gerberich SG, Injury Prevention Research, Universities of Minnesota and Iceland, Scientific Symposium: Discovery to Impact: The Next Generation, University of Minnesota, Minneapolis, Minnesota, April 2007.

Presentation: Gerberich SG, Minnesota Educators' Study: Overview and Case-Control Study, Minnesota Educators' Study Symposium, University of Minnesota, Minneapolis, Minnesota, April 2007.

Invited Presentation: Gerberich SG, Violence Prevention Overview, PubH 6123, Violence Prevention and Control: Theory, Research, and Application, University of Minnesota, Minneapolis, Minnesota, January 2007.

Invited Presentation: Gerberich SG, PubH 3001 (Personal and Community Health), Injuries and Occupational Health and Safety, Minneapolis: University of Minnesota, December 2006.

Presentation: Gerberich SG, Nachreiner NM, Ryan AD, Church TR, McGovern PM, Geisser MS, Watt, GD, Feda DM, Pinder E, Sage SK. Violence in the schools: Teachers at Risk, American Public Health Association, Boston, Massachusetts, November 2006.

Presentation: Gerberich SG, Nachreiner NM, Ryan AD, Church AD, McGovern PM, Geisser M, Watt GD, Feda DM, Pinder K, Sage S: Violence against teachers: Magnitude, consequences, and causes, International Society for Research on Aggression, Minneapolis, Minnesota, July 2006.

Presentation: Gerberich SG, Nachreiner NM, Ryan AD, Church TR, McGovern PM, Geisser M, Watt GD, Feda DM, Pinder K, Sage S: Violence Against Teachers: Magnitude and Etiology, Congress of Epidemiology, Seattle, Washington, June 2006. (Church: Presenter)

Publications (students identified with underline):

• Dissertations

Feda, Denise M. The impact of assault deterrents and written violence policies on Minnesota Educators' risk of physical assault, Ph.D. Thesis, University of Minnesota, Minneapolis, Minnesota, 2007

Pinder, Evette. Occupational Stress and Burnout: The Risk of Workplace Violence, Ph.D. Thesis, University of Minnesota, Minneapolis, Minnesota, 2008

Sage, Starr K. The Impact of School Funding and Resources on Educators' Risk of Physical Assault, Ph.D. Thesis, University of Minnesota, Minneapolis, Minnesota, 2008.

• Peer-Reviewed Scientific Publications – In Final Preparation (students identified with underline):

Gerberich, Susan Goodwin, Nachreiner, Nancy M., Ryan, Andrew D., Church, Timothy R., McGovern, Patricia M., Geisser, Mindy S., Watt, Gavin D., Feda, Denise M., Pinder, Evette., Sage, Starr K., Violence against teachers: Magnitude and Etiology. [SGG: PhD Thesis Advisor for DMF, EP, and SKS]

Gerberich, Susan Goodwin; Nachreiner, Nancy M; Ryan, Andrew D; Church Timothy R; McGovern, Patricia M; Geisser, Mindy S; Watt, Gavin D; Feda, Denise M; Pinder, Evette; Sage, Starr K. Risk Factors for Physical Violence against teachers. [SGG: PhD Thesis Advisor for DMF, EP, and SKS]

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TABLES

TABLE 1
COMPREHENSIVE PHASE PARTICIPANT CHARACTERISTICS

	Number	%
Gender		
Female	3607	76.2
Male	1102	23.3
Age (years)		
Less than 30	416	8.8
30 to <40	1033	21.8
40 to <50	1242	26.3
50 to <60	1732	36.6
60 or older	308	6.5
Education		
Associate Degree	8	0.2
Bachelor's Degree	1793	37.9
Master's Degree	2530	53.5
Education Specialist Degree	309	6.5
Doctorate Degree	69	1.5
Missing	22	0.5
Type of School Worked the Most Time		
Public	4137	87.4
Public Alternative	254	5.4
Public Charter	107	2.3
Public Magnet	84	1.8
Private (Parochial)	408	8.6
Private (Non-Parochial)	77	1.6
Missing	13	0.3
Job Classification		
Full-time Contract	3764	79.6
Part-time Contract	420	8.9
Long-Call Substitute	69	1.5
Building Substitute	15	0.3
All Other Substitutes	409	8.7
Multiple Classifications	34	0.7
Missing	20	0.4

TABLE 1 (CONTINUED)
COMPREHENSIVE PHASE PARTICIPANT CHARACTERISTICS

One Most Frequent Professional Activity in Past 12 Months	Number	%
Classroom Teacher	3196	67.6
Special Education	595	12.6
Administrator	167	3.5
Guidance Counselor	85	1.8
Librarian/Media Specialist	81	1.7
School Social Worker	66	1.4
School Psychologist	46	1.0
School Nurse	41	0.9
Teacher Assistant/Aide	34	0.7
Speech/Language Pathologist	29	0.6
Superintendent	23	0.5
Dept. Chair/Instructional Leader	22	0.5
Coach	12	0.3
Dean of Students	7	0.2
Advisor to Extra-Curricular Activities	9	0.2
Other	50	1.1
No one activity most common	251	5.3
Missing	11	0.2
Grade Level(s) Taught Most Frequently in Past 12 Months		
Kindergarten	246	5.2
First Grade	191	4.0
Second Grade	222	4.7
Third Grade	242	5.1
Fourth Grade	214	4.5
Fifth Grade	224	4.7
Sixth Grade	228	4.8
Seventh Grade	191	4.0
Eighth Grade	225	4.8
Ninth Grade	193	4.1
Tenth Grade	192	4.1
Eleventh Grade	111	2.4
Twelfth Grade	123	2.6
No one grade was most frequently taught	1643	34.7
Missing	24	0.5

TABLE 1 (CONTINUED)
COMPREHENSIVE PHASE PARTICIPANT CHARACTERISTICS

Topics Taught Most Frequently in Past 12 Months	Number	%
Elementary Education	1166	24.7
English	148	3.1
Language Arts	133	2.8
Reading	134	2.8
Fine Arts	244	5.2
Mathematics	297	6.3
Science	219	4.6
Social Studies	194	4.1
World Language (non-English)	103	2.2
Family Consumer Science	77	1.6
Business Education	38	0.8
Computer Technology	73	1.5
Industrial Technology/Applied Arts	49	1.0
English Language Learners/ESL	64	1.4
Special Education	403	8.5
Speech Pathology	96	2.0
Physical Education	150	3.2
Driver's Education	5	0.1
Health	42	0.9
Agriculture	14	0.3
Careers/Vocational	21	0.4
Life/Social Skills	53	1.1
Religion	4	0.1
Non one topic most frequently taught	503	10.6
Missing	9	0.2
Typical Class Size		
Less than 10	724	15.3
10 to less than 25	1666	35.2
25 to less than 45	1805	38.2
45 to less than 55	22	0.5
55 or more	38	0.8
Missing	14	0.3

TABLE 2
WORK-RELATED VIOLENCE RATES

Violence Rates Per 100 Persons Per Year

	Unadjusted Rate	Adjusted Rate and 95% CI
Physical	8.3	8.3 (7.6-9.1)
Non-Physical	38.6	38.4 (37.1-39.8)

Non-Physical Violence† Rates Per 100 Persons Per Year

	Unadjusted Rate	Adjusted Rate and 95% CI
Threat	20.3 (19.2-21.5)	20.6 (19.5-21.8)
Sexual Harassment	4.5 (3.9-5.1)	4.5 (3.9-5.1)
Verbal Abuse	33.4 (32.1-34.7)	32.9 (31.6-34.3)
Bullying	11.7 (10.8-12.6)	11.6 (10.7-12.6)

Adjusted for: Non-response, eligibility

TABLE 3
CHARACTERISTICS OF PERPETRATORS ASSOCIATED WITH
PHYSICAL AND NON-PHYSICAL VIOLENCE

Characteristics of Perpetrators	Physical (Specific Event)		Physical (Ongoing Event)		Non-Physical*	
	N	%	N	%	N	%
†Professional Relation with Perpetrator						
A student	560	95.4	61	100	2483	75.4
A school employee	9	1.5	3	4.9	552	16.8
Parent/Visitor/Trespasser	5	0.9	0	0	656	19.9
Other	2	0.3	0	0		
Unsure						
Missing	14	2.4	0	0	46	1.4
†Perceived Impairment Status of Perpetrator						
Yes, because of injury or illness	10	1.7	3	4.9	37	1.1
Yes, because of disability or developmental delay	460	78.4	56	91.8	1150	34.9
Yes, under the influence of alcohol, aerosols, or drugs (prescribed or non-prescribed)	9	1.5	2	3.3	166	5.0
Not impaired	91	15.5	5	8.2	1853	56.2
Unsure	29	4.9	3	4.9	411	12.5
Missing	10	1.7	0	0	59	1.8
†Perpetrator Gender						
Male	453	77.2	54	88.5	2545	77.2
Female	122	20.8	27	44.3	1485	45.1
Unsure	3	0.5	0	0	53	1.6
Missing (Refused)						
†Perceived age of perpetrator						
Age less than 13 years	418	71.2	47	77.1	985	29.9
13 to less than 16 years	121	20.6	15	24.6	1107	33.6
16 years to less than 18 years	31	5.3	4	6.6	768	23.3
Adult	9	1.5	3	4.9	1056	32.1
Unsure	2	0.3	0	0	27	0.8
Missing	10	1.7	0	0	48	1.5

*Non-physical violence category combines threats, sexual harassment and verbal abuse categories.

†Question denotes "check all that apply;" therefore, responses may total >100%

TABLE 4
CONSEQUENCES AND CHARACTERISTICS
OF PHYSICAL AND NON-PHYSICAL VIOLENCE

Consequences and Characteristics of Physical and Non-Physical Violence	Physical (Specific Event)		Physical (Ongoing Event)		Non-Physical Violence*	
	N	%	N	%	N	%
†Symptoms/Feelings Following Assault						
Frustration	303	51.6	39	63.9	2290	69.5
Anger	214	36.5	21	34.4	2008	60.9
Fear/anxiety/stress	165	28.1	18	29.5	1371	41.6
Sadness	147	25.0	19	31.2	1123	34.1
Fatigue	135	23.0	25	41.0	948	28.8
Difficulty sleeping	56	9.5	11	18.0	734	22.3
Irritability	60	10.2	11	18.0	906	27.5
Depression	50	8.5	5	8.2	525	15.9
Stress-related symptoms (headaches, stomach problems, etc.)	51	8.7	9	14.8	650	19.7
Shame/Low-self-esteem/Low self-confidence	37	6.3	5	8.2	448	13.6
Intrusive thoughts about the event	31	5.3	2	3.3	535	16.2
Hyperarousal/Hypervigilance/Overly cautious	22	3.8	4	6.6	324	9.8
Withdrawing from contact with people	24	4.1	3	4.9	270	8.2
Difficulty concentrating	20	3.4	2	3.3	397	12.1
Resurfacing memories of previous trauma	11	1.9	0	0	182	5.5
Other	9	1.5	1	1.6	90	2.7
Nightmares	5	0.9	1	1.6	122	3.7
Flashbacks	5	0.9	1	1.6	103	3.1
Avoidance of any reminders of the event	10	1.7	0	0	215	6.5
Hallucinations	0	0	0	0	7	0.2
Missing	14	2.4	2	3.3	68	2.1
Symptoms Lasted for at least 1 month?						
Yes	143	24.4	13	21.3	1149	34.9
No	413	70.4	47	77.1	2005	60.9
Missing	27	4.6	1	1.6	121	3.7
None	140	23.9	12	19.7	273	8.3
†Changes in your work situation as a result of event(s)						
Quit your job	13	2.2	0	0	121	3.7
Voluntary transfer to another location	9	1.5	1	1.6	159	4.8
Involuntary transfer to another location	0	0	0	0	27	0.8
Leave of absence	1	0.2	0	0	40	1.2
Restriction/modification of work activities	25	4.3	10	16.4	165	5.0
No Changes	513	87.4	49	80.3	2572	78.1
Other	5	0.9	0	0	39	1.2
Student/Perpetrator Treated/Moved	14	2.4	2	3.3	86	2.6
Educator Plans to Leave					28	0.9
Missing	10	1.7	0	0	102	3.1

*Non-physical violence category combines threats, sexual harassment and verbal abuse categories.

†Question denotes "check all that apply;" therefore, responses may total >100%

TABLE 5
CASE-CONTROL PARTICIPANT DEMOGRAPHICS AND EXPOSURES

DEMOGRAPHICS/EXPOSURES	CASES Number	%	CONTROLS Number	%
Gender				
Female	235	81.0	670	77.3
Male	55	19.0	197	22.7
Age				
Less than 30	26	9.0	72	8.3
30 to < 40	65	22.4	183	21.1
40 to < 50	83	28.6	234	27.0
50 to < 60	102	35.2	319	36.8
60 or older	14	4.8	59	6.8
Education				
Associate Degree	1	0.3	1	0.1
Bachelor's Degree	90	31.0	333	38.4
Master's Degree	163	56.2	450	51.9
Education Specialist Degree	27	9.3	64	7.4
Doctorate Degree	6	2.1	6	0.7
Missing	3	1.0	13	1.5
Type of School Worked in During Previous Month				
Public	253	87.2	713	82.2
Public Alternative	14	4.8	30	3.5
Public Charter	8	2.8	17	2.0
Public Magnet	7	2.4	5	0.6
Private (Parochial)	3	1.0	78	9.0
Private (Non-Parochial)	1	0.3	15	1.7
Missing	4	1.4	9	1.0
Job Classification During Previous Month				
Full-time Contract	252	86.9	694	80.1
Part-time Contract	18	6.2	99	11.4
Long-Call Substitute	3	1.0	8	0.9
Building Substitute	1	0.3	4	0.4
All Other Substitutes	11	3.8	53	6.1
Missing	5	1.7	9	1.0

TABLE 5 (CONTINUED)
CASE-CONTROL PARTICIPANT DEMOGRAPHICS AND EXPOSURES

Primary Professional Activity During Previous Month	CASES Number	%	CONTROLS Number	%
Classroom Teacher	113	39.0	601	69.3
Librarian/Media Specialist	3	1.0	17	2.0
School Nurse	3	1.0	5	0.6
Administrator	13	4.5	43	5.0
Superintendent	0	0	5	0.6
Dean of Students	1	0.3	5	0.6
Teacher Assistant/Aide	1	0.3	8	0.9
Advisor to Extra-Curricular Activities	1	0.3	3	0.4
Guidance Counselor	5	1.7	19	2.2
Coach	0	0	1	0.1
School Psychologist	6	2.1	6	0.7
School Social Worker	15	5.2	8	0.9
Special Education	117	40.3	109	12.6
Dept. Chair/Instructional Leader	0	0	2	0.2
Other	2	0.7	9	1.0
No one activity most common	5	1.7	12	1.4
Missing	5	1.7	14	1.6
Grade Levels Taught During Previous Month				
Kindergarten	53	18.3	125	14.4
First Grade	61	21.0	135	15.6
Second Grade	68	23.5	146	16.8
Third Grade	72	24.8	149	17.2
Fourth Grade	67	23.1	143	16.5
Fifth Grade	65	22.4	132	15.2
Sixth Grade	56	19.3	143	16.5
Seventh Grade	51	17.6	154	17.8
Eighth Grade	49	16.9	165	19.0
Ninth Grade	52	17.9	166	19.2
Tenth Grade	42	14.5	180	20.8
Eleventh Grade	40	13.8	175	20.2
Twelfth Grade	40	13.8	174	20.1
Missing	5	1.7	9	1.0

TABLE 5 (CONTINUED)
CASE-CONTROL PARTICIPANT DEMOGRAPHICS AND EXPOSURES

Topic(s) Taught During Previous Month	CASES Number	%	CONTROLS Number	%
Elementary Education	57	19.7	212	24.5
English	25	8.6	107	12.3
Language Arts	45	15.5	141	16.3
Reading	58	20.0	138	15.9
Fine Arts	17	5.9	69	8.0
Mathematics	52	17.9	177	20.4
Science	30	10.3	129	14.9
Social Studies	43	14.8	109	12.6
World Language (non-English)	3	1.0	21	2.4
Family Consumer Science	7	2.4	19	2.2
Business Education	2	0.7	11	1.3
Computer Technology	13	4.5	37	4.3
Industrial Technology/Applied Arts	4	1.4	15	1.7
English Language Learners/ESL	5	1.7	22	2.5
Special Education	78	26.9	94	10.8
Speech Pathology	13	4.5	19	2.2
Physical Education	19	6.6	51	5.9
Driver's Education	2	0.7	3	0.4
Health	0	0	13	1.5
Life/Social Skills	9	3.1	7	0.8
Religion	2	0.7	5	0.6
Missing	5	1.7	7	0.8
Typical Class Size During Previous Month				
Less than 10	81	27.9	116	13.4
10 to less than 25	58	20.0	279	32.2
25 to less than 45	62	21.4	254	29.3
45 to less than 55	0	0	1	0.1
55 or more	1	0.3	5	0.6
Missing	6	2.1	6	0.7

FIGURES

FIGURE 1: RESPONSE FLOWCHART

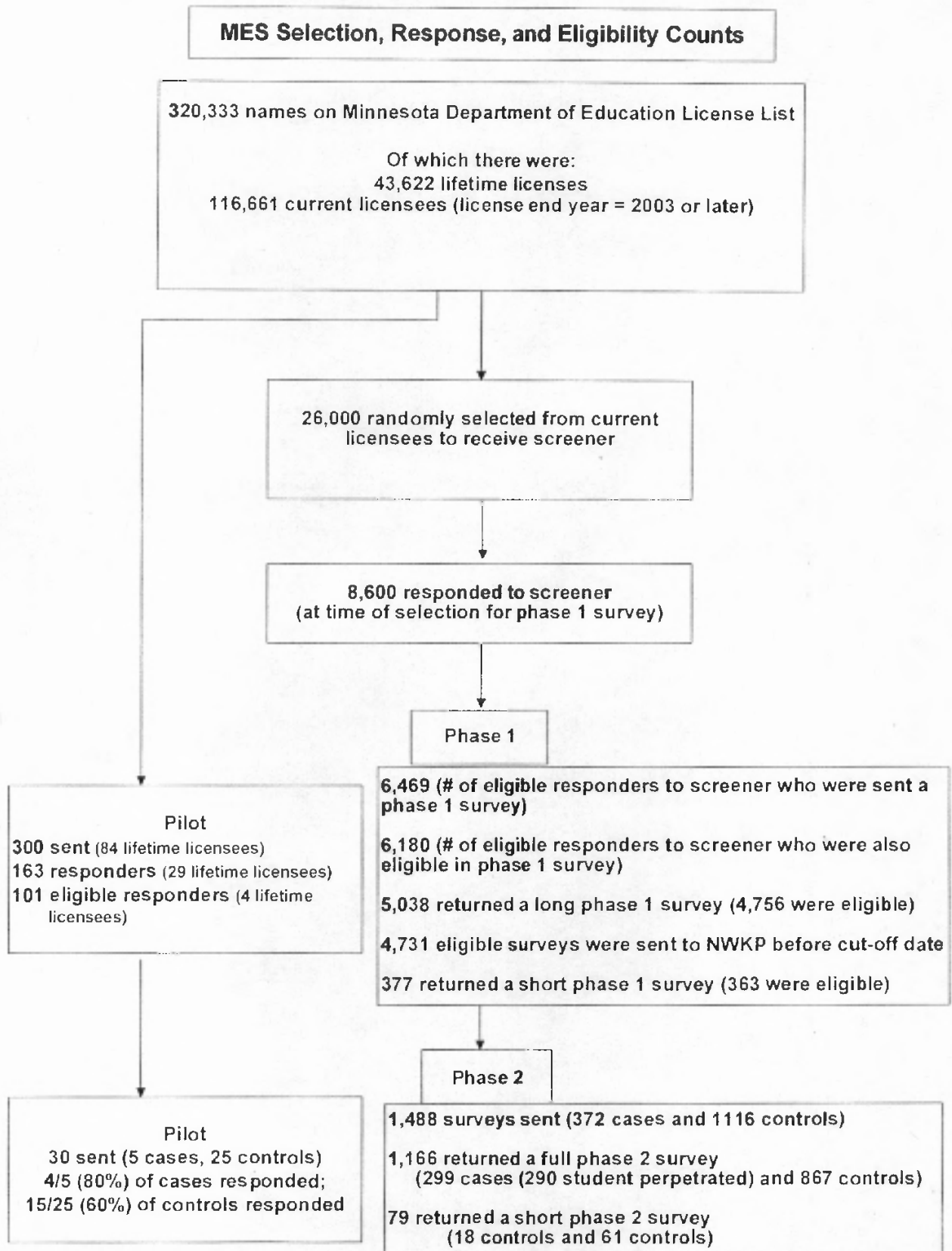


FIGURE 2. VIOLENCE AGAINST TEACHERS: ETIOLOGY AND CONSEQUENCES
CONCEPTUAL MODEL

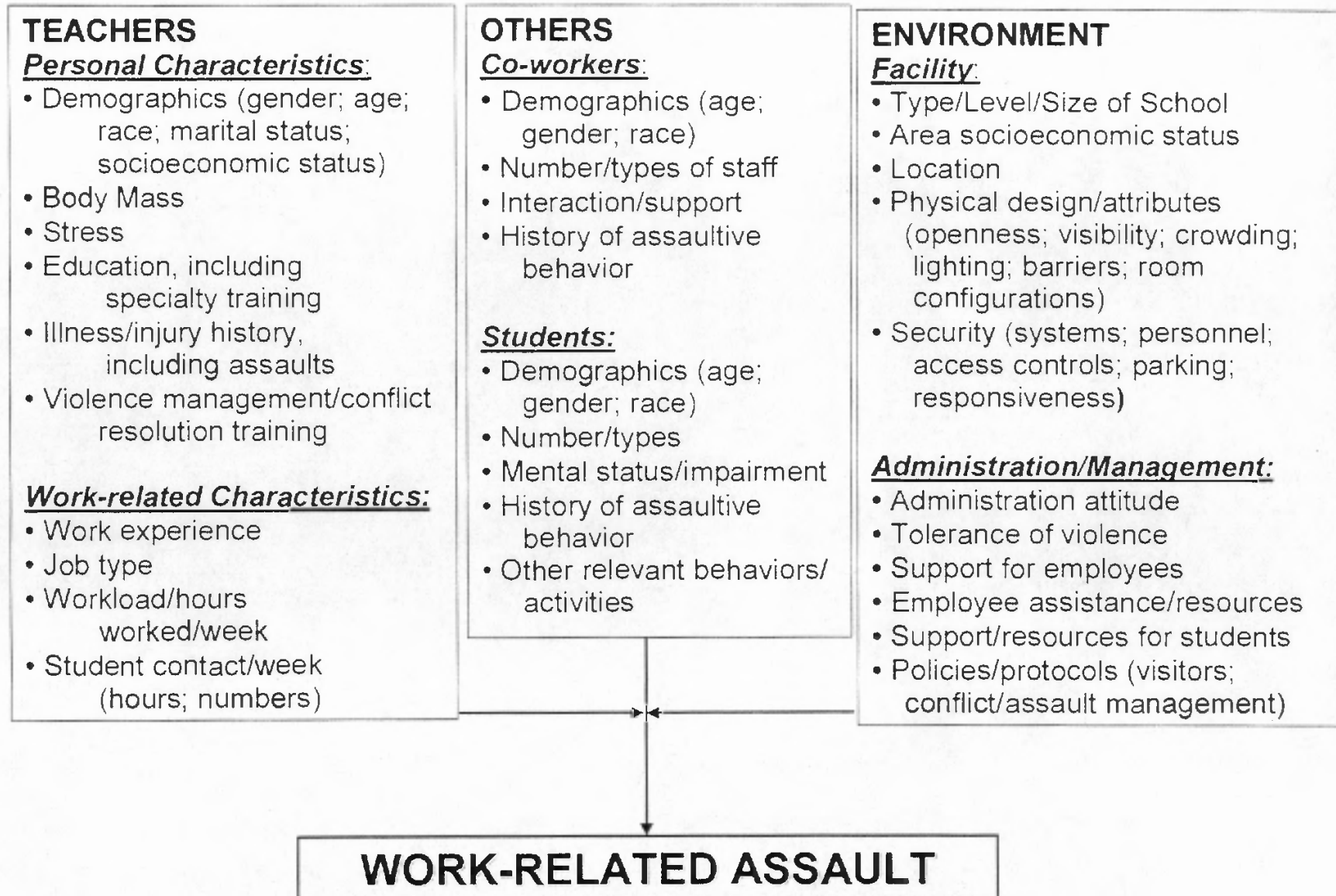


FIGURE 3: CAUSAL MODEL

