



## Fatigue and on-duty injury among police officers: The BCOPS study

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### ABSTRACT

**Introduction:** Policing involves inherent physical and psychological dangers as well as occupational stressors that could lead to chronic fatigue. Although accounts of adverse events associated with police fatigue are not scarce, literature on the association between chronic fatigue and on-duty injury are limited. **Methods:** Participants were officers from the Buffalo Cardio-Metabolic Occupational Police Stress (BCOPS) Study. A 10-item questionnaire was administered to assess how tired or energetic the officers generally felt irrespective of sleep hours or workload. The questionnaire consisted of five positively worded and five negatively phrased items that measured feelings of vigor/energy and tiredness, respectively. Total as well as separate scores for positive and negative items were computed by summing scores of individual items. Payroll records documenting each officer's work history were used to assess occurrence of injury. Poisson regression was used to estimate prevalence ratios (PR) of injury. **Results:** Nearly 40% of officers reported feeling drained. Overall prevalence of on-duty injury during the past year was 23.9%. Injury prevalence showed a significant increasing trend across tertiles of total fatigue score: 19.6, 21.7, and 30.8% for lowest, middle and highest tertiles, respectively (trend  $p$ -value = 0.037). After controlling for potential confounders, a 5-unit increase in total fatigue score was associated with a 12% increase in prevalence of injury which was marginally significant ( $p = 0.075$ ). A 5-unit increase in fatigue score of the positively worded items was associated with a 33% increase in prevalence of injury (PR = 1.33, 95% CI: 1.04–1.70,  $p = 0.022$ ). **Conclusion:** Officers who do not feel active, full of vigor, alert, or lively had a significantly higher prevalence of non-fatal work place injury compared to their counter parts. **Practical applications:** With additional prospective evidence, workplace interventions designed to enhance level of energy may reduce feelings of tiredness and hence may prevent workplace injury.

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### 1. Introduction

Fatigue, broadly defined as “a feeling of weariness, tiredness, or lack of energy,” is a frequently cited complaint among the U.S. workforce with reported prevalence of 38% (Ricci, Chee, Lorandeanu, & Berger, 2007). It is an especially serious concern among police officers who are overly fatigued because of long and irregular work hours, shift work, sleep deprivation, and the inherent physical and psychosocial danger associated with the job (Vila, 2006; Vila & Kenney, 2002). Law enforcement is also one of six occupations with the highest incidence rates of nonfatal occupational injuries. The most recent data provided by U.S. Bureau of Labor Statistics (BLS) indicated that, in 2014, police and Sheriffs patrol officers had one of the highest days away from work (DAFW) nonfatal injury rates (485.8 per 10,000 full-time workers) among all occupations (107.1 per 10,000 full-time workers)

and incurred the highest number of injuries among local government and second highest among state government employees (BLS, 2014). Fatigue in police officers impairs vigilance, reaction time, and performance thereby elevating the risk for fatal and non-fatal injuries to both the officers and the general public (Garbarino et al., 2007; Rajaratnam et al., 2011; Vila, 2006; Vila & Kenney, 2002; Waggoner, Grant, Van Dongen, Belenky, & Vila, 2012).

While considerable attention has been placed on the psychosocial and cardio-metabolic health of police officers (Violanti et al., 2006), scientific research on occupational injury of officers is limited, and statistics for injuries are less readily available (LaTourrette, 2011). In 2009, the National Public Safety Agenda, which is part of the National Occupational Research Agenda (NORA) for occupational safety and health research and practice in the United States, recognized that data on occupational injuries and illness among law enforcement personnel are not sufficient (NORA, 2009). Fatigue is a well-known risk factor for injury, yet the scientific literature documenting the prevalence of fatigue among police officers, particularly its association with non-fatal on-duty injury, is limited (James & Vila, 2015).

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Fatigue is a latent construct that cannot be directly measured. It is argued that fatigue is best viewed as a continuum (Lewis & Wessely, 1992; Ricci et al., 2007), where at the lower end it occurs frequently and consists of acute episodes that resolve quickly following an intervention (e.g., rest, improvement of the stressor), while at the severe end it occurs less frequently but is symptomatic of a more chronic and potentially disabling conditions that cannot be quickly resolved with rest (often referred to as chronic fatigue). Chronic fatigue was defined by Barton et al. (1995) as “a general tiredness and lack of energy irrespective of whether an individual has not had enough sleep or has been working hard, which persists even on rest days and holidays.” Although there is no standard way to assess fatigue, there are a variety of questionnaires, with high reliability and validity, which have been designed to assess fatigue in working populations (De Vries, Michielsen, & Van Heck, 2003). However, the applicability of these instruments in assessing fatigue prevalence in police officers has not been explored.

Prior studies that highlighted the significant impact of fatigue on injury and performance in police officers (James & Vila, 2015; Senjo, 2011; Vila, 2006; Violanti et al., 2012, 2013) utilized proxy indicators of fatigue (e.g., shift work, long work hours, insufficient sleep); rather than chronic fatigue assessed using one of several validated instruments. Therefore, the purpose of this research was to estimate the prevalence of chronic fatigue (assessed based on a validated instrument) and then examine its association with non-fatal workplace injury (objectively assessed using organizational work history records), among officers working in mid-sized urban police department. In our analysis, the association of interest was adjusted for demographic and lifestyle factors that were reported to affect non-fatal occupational injury in various occupational groups. These factors included age (Landen & Hendricks, 1992), gender (Berecki-Gisolf, Smith, Collie, & McClure, 2015), race/ethnicity (Hurley & Lebbon, 2012), education (Kim et al., 2014), workload (Nakata et al., 2006), physical activity (Caban-Martinez et al., 2015), and alcohol consumption (Stallones & Xiang, 2003).

## 2. Methods

### 2.1. Study population

Participants from the Buffalo Cardio-Metabolic Occupational Police Stress (BCOPS) study were used for the current analyses. The BCOPS study was a cross-sectional study aimed at investigating the associations of occupational stressors with the psychological and physiological health of police officers. The study was initiated in 2004 and a total of 710 police officers who worked with the Buffalo Police Department in New York were invited to participate in the BCOPS study; 464 (65.4%) officers agreed to participate and were examined once during the period of June 4, 2004 to October 2, 2009. No specific inclusion criteria were indicated for the study, only that participants be a sworn police officer and willing to participate. Comparisons of available demographic variables (sex, age, and police rank) showed no significant differences between participants and non-participants. A written informed consent was collected from each participant. Data collection was performed at The Center for Preventive Medicine, State University of New York at Buffalo. The study was approved by the Internal Review Board of the State University of New York at Buffalo, and the National Institute for Occupational Safety and Health (NIOSH) Institutional Review Board (IRB).

### 2.2. Measures and study design

Data originated from two sources. The first source was the BCOPS study where data on demographic, physical, biological, and psychosocial characteristics were collected from each participant. As part of the study, the participants filled out a questionnaire designed to assess

chronic fatigue which served as the exposure variable of interest. The second source was work history records of the BCOPS study participants obtained from the Buffalo, NY police payroll department. The work history records were used to derive occurrence of nonfatal on-duty injury which served as the outcome variable of interest.

### 2.3. Assessment of chronic fatigue

Chronic fatigue was assessed using a 10-item questionnaire developed by Barton et al. (1995). In the current study the questions about chronic fatigue were introduced with this statement: “The following items relate to how tired or energetic you generally feel, irrespective of whether you have had enough sleep or have been working very hard. Some people appear to suffer from permanent tiredness, even on rest days and holidays, while others seem to have limitless energy. Please indicate the degree to which the following statements apply to your own normal feelings.” The study participants were then asked to rate (score) each of the 10 items on a five-point Likert scale (5 = very much, 4 = much, 3 = somewhat, 2 = little, 1 = not at all). The questionnaire consisted of five items (I usually feel drained, I feel tired most of the time, I usually feel rather lethargic, I often feel exhausted, and I feel weary much of the time) designed to measure general feelings of tiredness and lack of energy while the remaining five items (I generally feel I have plenty of energy, I generally feel quite active, I generally feel full of vigor, I generally feel alert, and I usually feel lively) were positively worded to measure general feelings of vigor and energy (the opposite of fatigue). A single total score was computed by summing the ratings from the 10 items after reverse-coding the five positively oriented items. A higher score indicates greater feelings of chronic fatigue. In addition, separate scores for the positively and negatively worded questions were computed. The chronic fatigue questionnaire was introduced to the BCOPS study 9 months after the start of the first clinic examination and hence only 316 of the 464 participants had the opportunity to complete the questionnaire (the remaining 148 officers who did not complete the fatigue questionnaire were excluded from analyses). The instrument has high reliability with Cronbach's alpha coefficient of 0.84 (Cohen, Manion, & Morrison, 2000). For our sample of officers the estimated alpha coefficient was 0.94 and it was obtained using the SAS procedure PROC CORR with the ALPHA option.

### 2.4. Assessment of on-duty injury

The second source of data (the work history records) was a longitudinal dataset that was made available in an electronic format and contained a day-by-day account of activities, for each officer, including the start time of work, the type of activity (e.g., regular work, overtime work), the type of leave (e.g., injury, sick, or vacation), and the number of hours worked for a period spanning 15 years (from May 23, 1994 to date of the BCOPS study exam). The work history records during the 1-year period prior to date of clinic examination were used to derive occurrence of injury (yes/no) for each officer and this binary variable served as the outcome variable of interest in the current analyses. For example, during the BCOPS study if an officer was examined on 8/15/2005 then we examined daily work history records of this officer from 8/15/2004 to 8/15/2005 (1-year period) to assess occurrence of on-duty injury. The work history data contained work absences due to injury that occurred while on duty. The occurrence of on-duty injury was identified when the payroll record indicates that an officer is paid for regular work but is off-duty due to injury that occurred while at work. No additional information was available concerning the type of injury or its severity. The work history data were also used to derive dominant shift (a covariate of interest) during the same 1-year period for each officer. The methodology for derivation of dominant shift as day, afternoon or night is described in Fekedulegn et al. (2013).

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