Negative workplace behavior: Temporal associations with cardiovascular outcomes and

psychological health problems in Australian police

ABSTRACT

Negative workplace behavior, such as workplace bullying, is emerging as important work-related psychosocial hazards with the potential to contribute to employee ill health. We examined the risk of two major health issues (poor mental and cardiovascular health) associated with current and past exposure to negative behavior in the workplace. Data from 251 police officers, who completed an anonymous mail survey at two time-points spaced 12 months apart, support the potential role of exposure to negative workplace behavior in the development of physical disease and psychological illness. Specifically we saw significant effects associated with past exposure to such behavior on indicators of poor cardiovascular health, and a significant effect of current exposure on the indicator of mental health problems. Our findings reinforce the need to continue to study links between employee health and both negative workplace behavior and more severe cases of bullying, particularly the mechanisms involved to strengthen theory in this area, and to protect against employee ill health (specifically cardiovascular outcomes and psychological problems) by preventing negative behavior at work.

Key words: negative workplace behavior, workplace bullying, cardiovascular disease, mental illness, psychosocial hazards, occupational stress, police

Cardiovascular disease (CVD) is the most widespread and most expensive health problem in the industrialised world. In the United States of America for instance, up to half of all men and a third of all women will develop CVD (Smith & Ruiz, 2002). CVD is also the leading cause of death world-wide, responsible for 16.7 million deaths in 2002 or 29% of all global deaths (World Health Organization [WHO], 2003). This figure is expected to rise to 23.4 million by 2030 (WHO, 2008). Likewise, CVD kills more Australians than any other group of diseases (Australian Institute of Health and Welfare, 2004). There are many modifiable risk factors (such as smoking, high blood cholesterol, physical inactivity, diabetes, and being overweight) which can contribute to the development of CVD. Among these modifiable risk factors, hypertension is the largest cause of deaths worldwide (Lopez, Mathers, Ezzati, Jamison, & Murray, 2006), defined as untreated systolic blood pressure greater than 140mmHg or diastolic blood pressure greater than 90mmHg (Chobanian et al., 2003).

With rising cardiovascular problems there has been increasing interest in the observed association between poor cardiovascular health and poor psychological health. Australian data suggest that mental and behavioral problems are collectively the leading cause of the disability burden (Vos & Mathers, 2000). Depression is the most prevalent form of mental illness in developed countries and represents a growing contributor to the global burden of disease (WHO, 2001) expected to account for 15% by 2020 (Murray & Lopez, 1997). In Australia, depression is the fourth leading contributor to the general disease burden, behind ischaemic heart disease, stroke, and chronic obstructive pulmonary disease (all part of the CVD group of diseases) (Mathers, Vos, & Stevenson, 1999). Given the high prevalence of mental illness (and depression in particular) as well as the associated costs for individuals, organizations, and society, it is imperative to consider occupational risk factors.

Psychological and social factors can have a direct impact on the development and course of physical disease processes through the physiological activity associated with stress and negative emotions (Smith & Ruiz, 2002). In the workplace, job strain (i.e., an imbalance between demands

and control, or between efforts and rewards) has been studied as the major psychosocial health hazard. Based largely on the results of prospective studies, two reviews (Peter & Siegrist, 2000; Smith & Ruiz, 2002) concluded that job strain is associated with increased risk of CVD. For example, the Whitehall II prospective cohort study found that working under conditions of job strain (i.e., low decision latitude and high demands) was associated with the highest risk of CVD (Kuper & Marmot, 2003). However, the precise work characteristics that impact on heart health and the mechanisms by which they operate remain unclear (Smith & Ruiz, 2002).

There is also growing evidence that working conditions are related to mental health problems. Recent research has found a strong cross-sectional association between effort-reward imbalance and depression (Pikhart et al., 2004) and a five-year prospective association between poor working conditions (i.e., low influence and low supervisor support for women, and high job insecurity for men) and depression (Rugulies et al., 2006). But the occupational risk factors for psychological problems appear to be broader than job strain. For example, team climate predicted doctor-diagnosed depression after adjusting for lifestyle factors, whereas job control, job demands, and job strain did not (Ylipaavalniemi et al., 2005). Interpersonal conflict has also been linked to increased risk of psychiatric morbidity (Romanov et al., 1996).

Negative workplace behavior

Negative workplace behavior has recently emerged as an important work-related psychosocial hazard with the potential to contribute to physical disease and mental illness. Such behavior is defined as actions and practices directed at employee(s) in the workplace that are unwanted and have the potential to cause discomfort (Hoel, Faragher, & Cooper, 2004). It has been studied under a variety of labels such as workplace bullying, mobbing, and harassment. A recent meta-analysis supports the association between these patterns of behavior and employee health. Bowling and Beehr (2006) analyzed 90 samples from studies of various forms of negative behavior aimed at intentionally harming another employee in the workplace. They found significant positive correlations between negative behavior and: depression (weighted mean correlation corrected for

reliability, $\rho = .34$); anxiety ($\rho = .31$); physical symptoms ($\rho = .31$); and generic strain (multiple health strains such as depression and physical symptoms) ($\rho = .35$). A separate meta-analysis found a similar effect linking sexual harassment to poor mental health ($\rho = -.27$) (Willness, Steel, & Lee, 2007). Emerging data from longitudinal studies support the epidemiological link between negative workplace behavior and health, for example workplace bullying predicts sickness absence over time (Kivimäki et al., 2001). Very few studies have investigated the impact of negative workplace behavior on CVD outcomes. Kivimäki et al. (2003) found that targets of prolonged bullying over a two-year period had a greater risk of the onset of CVD relative to non-targets. Notably, these bullying targets were also at even greater risk of depression compared with non-targets. Further, in a sample of low-income workers, sexual harassment (but not more general negative workplace behaviors nor other physical occupational hazards) was related to elevated systolic blood pressure (Krieger et al., 2008).

Although the mechanisms by which exposure to negative behavior in the workplace affects health are unclear, there are a number of emerging theoretical lines of thought. As a severe chronic stressor (Zapf, 1999), negative behaviors at work may be associated with physiological responses that can contribute to the development of disease and illness. Consistent with this idea, a recent study observed lower concentrations of salivary cortisol upon awakening in bullied compared with non-bullied respondents, which indicates that the bullied respondents were probably developing chronic symptoms of a sustained physiological stress response (Hansen et al., 2006). Being targeted by negative behaviors is also frequently accompanied by feelings of shame, anger, and anxiety (Leyman, 1990). Such negative emotional responses are associated with stress-induced immune system dysregulation, resulting in inflammatory cytokine mediation of depressive illness (Kiecolt-Glaser, McGuire, Robles, & Glaser, 2002; Miller & Blackwell, 2006).

In sum, a body of evidence from cross-sectional studies supports the link between exposure to various forms of negative workplace behavior and psychological health complaints. In contrast, there is almost no evidence that addresses the potential cardiovascular impacts of this exposure. Lines of

theory are emerging but far from established. The issue of whether or not negative workplace behavior is a risk factor specifically for CVD and mental health problems requires thus further research.

Accordingly the aim of our study was to examine the risk of mental health problems and poor cardiovascular health associated with exposure to negative workplace behavior. In this study, poor cardiovascular health was defined as having high blood pressure or consulting a medical practitioner due to cardiovascular symptoms. Utilizing data from two surveys administered over a 12-month timeframe, we investigated the health outcomes associated with current and past exposure to negative workplace behavior so as to inform secondary and tertiary prevention initiatives. Based on the empirical findings and potential mechanisms reviewed above, we expected that the severity of exposure to negative workplace behavior would be positively associated with poorer cardiovascular (H1) and mental health (H2) outcomes. Given the nascent theory development in this area, we explored but could not offer a hypothesis for differentiating between current and past exposure and impacts.

METHOD

Sample and procedure

A questionnaire was sent via post to all ($N = 3,250$) sworn frontline police officers at middle and lower levels within an Australian police organization (Time 1; T1). A total of 716 officers completed and returned the questionnaire (response rate = 22%). One year later, 518 officers returned a completed follow-up survey (Time 2; T2) (response rate = 18%). Our sample consisted of the 251 frontline police officers (43% of the T1 sample) who completed the survey at both time-points (225 male and 26 female). The officers' mean age was 41.93 years ($SD = 8.49$) and 86% were married or in a defacto relationship. Finally, 139 officers held the rank of Sergeant (middle management) and the remaining 112 held the rank of Constable. The sample was representative by gender, M = 88%, F = 12%, $\chi^2 (1) = 2.61$, $p = .10$, as compared with the police organization's *Annual Report* data, but there was an over representation of Sergeants $\chi^2 (1) = 52.69$, $p < .001$. To assess potential bias due to

rank, using one way ANOVA we confirmed that there was no difference by rank regarding levels of exposure to negative workplace behavior at T1 ($F < 1$) or at T2 ($F < 1$).

Approval from the Human Research Ethics Committee at the University of South Australia was obtained prior to commencing the study.

Measures

Participants provided self-reports at T1 and T2 of the degree of victimization (in the form of negative behavior) they had experienced over the previous 12 months in response to the following definition (agreed upon by the police organization and police officer union representatives): "Bullying is defined as unreasonable, unacceptable or inappropriate behaviour that is intimidating, insulting, offensive, degrading or humiliating." Responses were provided on a 5-point scale, from 0 (*Very rarely/never*) to 4 (*Very often/always*). Hereafter, this measure is referred to as negative workplace behavior because the definition is not stringent enough to meet international standards in terms of the powerlessness criterion of bullying (see Einarsen, Hoel, Zapf, & Cooper, 2003).

Cardiovascular health was assessed at T2 only with two self-report indicators of cardiovascular risk in the past 2 years: (1) High blood pressure as confirmed by a medical practitioner, (0 = low or normal blood pressure, 1 = high blood pressure); and (2) Visiting a health professional in relation to cardiac symptoms such as chest pain or heart attack, referred to hereafter as 'cardiac consultation' (0 = no cardiac consultation, 1 = cardiac consultation). Notably, research has shown a high correspondence between self-reported and independently documented cardiac symptoms, so there is evidence for the validity of the self-report method (Bosma, Peter, Siegrist, & Marmot, 1998).

Mental health was assessed at T1 and T2 with the 12-item General Health Questionnaire (GHQ-12) (Goldberg & Williams, 1988), one of the most widely utilized screening questionnaires for psychological disorders. Responses are indicated on a 4-point scale and relate to countenance in the past two weeks (e.g., 1 = *better than usual*, 4 = *much less than usual*). A cut-off of 4 was used to identify cases of clinical significance (Goldberg & Williams, 1998), recoded as 0 = no case, 1 = clinical case.

Statistical analysis

Logistic regression was conducted to determine whether two types of exposure (past exposure at T1 and current exposure at T2) predicted the indicators of poor cardiovascular health and cases of psychological illness. We calculated odds ratios (ORs) and 95% confidence intervals (CI) for the self-reported cardiovascular (high blood pressure and cardiac consultation) and psychological disorder outcomes as measured in the T2 survey, after controlling for age and rank and, in the case of psychological disorders, also controlling for T1 status on this outcome. Gender was not controlled for due to the low number of women in the sample. Analyses were conducted using SPSS v15.0 software.

RESULTS

Exposure to negative workplace behavior and inter-correlations

In the T1 survey, 80 (39.1%) officers reported having some level of exposure (i.e., 1 to 4 on the scale) to negative behavior at work in the last 12 months. At T2 the equivalent number was again 80 (39.1%), but not entirely the same 80 officers as at T1. Table 1 displays the inter-correlations between the study variables. As shown, the measures of past (T2) and current (T1) exposure to negative workplace behavior were moderately positively correlated. The two cardiovascular outcomes were also moderately positively related, as was status on the psychological disorders indicator variable across the two different time points. Finally, the exposure variables were significantly positively associated with the outcomes, with the exception of current exposure (T2) and high blood pressure.

[Insert Table 1 about here]

Negative workplace behavior as a predictor of employee health

Hypothesis 1 predicted a positive relationship between exposure and poorer cardiovascular outcomes. As shown in Table 2, in addition to age, past exposure (T1) to negative workplace behavior was significantly positively associated with higher blood pressure. After adjusting for age and rank the OR was 2.06. The results for cardiac consultation are presented in Table 3 with the

same pattern of results. After adjusting for age (again a significant predictor) and rank the OR for past exposure (T1) was1.56. Hypothesis 1 was thus supported. Hypothesis 2 predicted a positive association between exposure and mental health problems. As displayed in Table 4, there was a significant effect of current exposure (T2) to negative workplace behavior on the indicator of clinically significant mental health problems, supporting Hypothesis 2. The OR was 1.72 after controlling for age, rank, and importantly the initial status on this outcome.

[Insert Tables 2, 3, and 4 about here]

DISCUSSION

This study examined the associations between exposure to negative behavior at work and indicators of two important employee health outcomes – cardiovascular and psychological health problems – in a sample of Australian police officers. The findings support the potential role of negative workplace behavior in the development of physical disease and mental illness, confirming the status of negative behavior as an important psychosocial occupational hazard.

We observed a relationship between past exposure to negative workplace behavior and two indicators of poor cardiovascular health assessed 12 months later. These effects indirectly support previous research with bullied employees showing that targets experience chronic physiological over-arousal of the stress response system (Hansen et al., 2006) sufficient to contribute to cardiovascular symptoms. This process may be exacerbated by anticipatory stress, whereby anticipation of negative interactions at work may activate stress response mechanisms as fully as the actual experience (cf. Gaaba, Rohlederb, Natera, & Ehlert, 2005).

The significant association of past exposure with both cardiovascular risk indicators suggests that such exposure is associated with poor cardiac health, perhaps even 12 or more months following cessation of the exposure. Hamilton et al. (2008) found that, even though exposure to bullying in adolescence had long ceased, those young men who still harbored anger towards the experience had significantly greater resting blood pressure values compared to those who felt no anger. Lingering emotions towards previous exposure to negative behavior at work may have played a role here,

which is a possibility that should be further explored. Rumination about the experience may play a similar role; mental recreation of a stressful event, even days or years later, can produce a physiological cardiovascular response (Glyn, Christenfeld, & Guerin, 2007). We did not see an effect of current exposure to negative workplace behavior on either measure of cardiovascular health. Whilst the majority of studies indicate that chronic stress leads to increased acute reactivity and long-term adverse cardiovascular consequences, a small body of evidence suggests certain chronic stressors can result in decreased cardiovascular responses to acute stress possibly due to habituation effect (Gump & Matthews, 1999). In addition, flashbacks of previous episodes may reactivate the physiological stress response (e.g., Matthiesen & Einarsen, 2004; Mikkelsen & Einarsen, 2002) and contribute to the effect of past (but not current) exposure. The retrospective two year timeframe for the cardiovascular measures may also explain our results; potentially the cardiovascular outcomes could have occurred before the bullying exposure, which is a limitation of the study.

For psychological health we saw that current exposure to negative workplace behavior was associated with increased risk of mental health problems. Importantly, we found this significant effect even after controlling for initial mental health status, lending greater support to the premise that being targeted by negative behavior is detrimental for employee psychological health. This link is consistent with the stress—reaction exposure model, which predicts that changes in strain occur simultaneously with changes in stressors with strain subsiding in the absence of continuing exposure (Frese & Zapf, 1998). In terms of potential mechanisms, as outlined in the *World Health Report on Mental Health* (WHO, 2001), over time normal mood fluctuations may lead to sustained changes in mood and eventually a depressive episode. As noted above, flashbacks and intrusive thoughts could exacerbate this progression if the experience cannot be positively accommodated into the worker's mental representations of the world (cf. Janoff-Bulman, 1992).

Notably, workplace bullying exposure is more severe (in terms of frequency and duration) than the levels of exposure to negative behavior examined here. Our findings therefore concern not just the health consequences of bullying as a severe workplace stressor, but also the positive associations

of mental health problems and poor cardiovascular health with increasing severity of exposure to negative behavior at work, ranging from relatively infrequent exposure to being targeted on a daily basis. The percentage of employees affected may be even higher than indicated in this study; the low response rate may signal a widespread problem with negative behavior in the organization, which may have contributed to non-response.

Theory development regarding the processes by which exposure to negative behavior at work affects psychological and physical health is really just emerging, stimulated by empirical observation. Towards this end, our results highlight the need to turn attention to the mechanisms involved. In particular, the mediating role of felt emotions, cognitive rumination, and flashbacks (and the corresponding physiological activity) should be explored to understand the potential effects on cardiac health over the longer-term. For psychological health, changes in mood – especially changes within-persons over time – should be explored to understand how exposure affects people in the shorter-term. Diary studies would be particularly useful in this regard.

Strengths and limitations

As the cardiac dependent measures examined here were not introduced until Time 2, initial symptoms of CVD (as well as traditional risk factors) were not controlled for, which is clearly an important issue for establishing whether or not negative workplace behavior is an independent risk factor and for ruling out reverse causality, especially considering the results of Kivimäki et al. (2003). Another limitation is that the dependent measures were based on self-report rather than physiological or clinical assessments. However, a good correspondence between self-reported and verifiable cardiac symptoms (Bosma et al., 1998) and the good concurrent validity of the GHQ-12 compared with clinical interview data (Goldberg et al., 1997) help to offset limitations in this regard. Whilst chest pain is commonly associated with cardiac diseases, it can also be associated with other conditions such as musculoskeletal diseases of the chest wall, shoulders, gastrointestinal diseases (especially gall bladder, acid reflux, and ulcers), cervical arthritis or other neurological conditions (Cohn & Cohn, 2002). Thus the reported chest pain in this study may not have always resulted in a

cardiac condition being diagnosed, but may be an indicator of other poor health outcomes (Mizyed, Fass, & Fass 2009), although the significant moderate positive correlation between the two cardiac measures offsets this concern to some degree. The cardiovascular health outcomes used here also represent less definitive end-points than cardiac events (such as myocardial infarction) or clear manifestations of CVD (such as angina pain and blood clot formation). Finally, as noted above, the two-year time frame of the cardiovascular measures creates a potential overlap between the negative behavior exposure and outcomes, which makes interpretation of the effects difficult. Overall then, the use of objective physiological and clinical measures at repeated time-points should be a priority for future research.

However, it is important to note that the relationship between negative workplace behavior, as well as more severe victimization in the form of bullying, and both CVD and psychological illness represents an emerging area of research, and to answer important questions research must progress from preliminary investigations (such as this) to comprehensive studies. Our findings suggest that it is worthwhile to continue along this line of inquiry and to begin to examine potential psychological mechanisms (e.g., negative emotions, flashbacks, changes in more stable moods) linking negative behavior and/or bullying to cardiovascular and psychological health.

Implications and conclusion

On the basis of the data presented here (and other recent evidence) it seems both timely and vital to go beyond the study of job strain to examine more specific occupational stressors that may function as independent risk factors for cardiovascular and psychological health problems. By identifying new specific risks, hazard identification can be initiated and hazard control can be implemented via specific workplace interventions. There is also the possibility of incorporating workplace psychosocial assessment as a routine part of cardiac care and clinical treatment for psychological disorders, which will require the precise documentation of psychosocial risks. As well, psychosocial hazards in the workplace may be addressed at the individual level after the onset of disease symptomatology to mitigate any further health risks. Research must therefore continue to

identify specific potential psychosocial risk factors. The emerging evidence suggests that negative workplace behavior is likely to be one such factor that is hazardous for cardiac and mental health.

Although we studied police officers, the fundamental nature of the physiological and psychological processes involved, as well as the widespread nature of negative workplace behavior (Glendinning, 2001), mean that *all* organizations should be concerned. The overarching implication is the potential to protect against employee ill health, specifically cardiovascular and psychological problems, by preventing bullying and negative behavior at work. Prevention efforts might involve job design initiatives to target the causes of bullying and negative behavior in the work environment, which include high levels of role conflict, poor leadership and supervisory behavior, lack of information flow, and a negative social climate (e.g., Coyne, Smith-Lee Chong, Seigne, & Randall, 2003; Einarsen, Raknes, & Matthiesen, 1994; Vartia, 1996; Zapf, Knorz, & Kulla, 1996), and specifically in policing high job demands combined with low job control and social support (Tuckey, Dollard, Hosking, & Winefield, 2009). In future research it is imperative to further investigate the causes of negative behavior at work, including contributors in different occupational groups, in order to implement specific evidence-based prevention initiatives. Finally, it will be important to utilize organizational structures and systems that support early identification of problem areas, for example regular surveillance of the psychosocial work environment (cf. Dollard, Skinner, Tuckey, & Bailey, 2007).

REFERENCES

Agervold, M., & Mikkelsen, E. G. (2004). Relationships between bullying, psychosocial work environment and individual stress reactions. *Work and Stress, 18*, 336-351.

Bosma, H., Peter, R., Siegrist, J., & Marmot, M. (1998). Two alternative job stress models and the risk of coronary heart disease. *American Journal of Public Health, 88,* 68–74.

Bowling, N.A., & Beehr, T.A. (2006). Workplace harassment from the victim's perspective: A theoretical modal and meta-analysis. *Journal of Applied Psychology, 91*, 998-1012.

Chobanian, A.V., Bakris, G.L., Black, H.R., Cushman, W.C., Green, L.A., et al. (2003). Seventh report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. *Hypertension, 42*, 1206-1252.

Cohn, J.K., & Cohn, P.F. (2002). Chest pain. *Circulation, 106*, 530-531.

Coyne, I., Smith-Lee Chong, P., Seigne, E., & Randall, P. (2003). Self and peer nominations of bullying: An analysis of incident rates, individual differences, and perceptions of the work environment. *European Journal of Work and Organizational Psychology, 12*, 209-228.

Dollard, M.F., Skinner, N., & Tuckey, M.R., & Bailey, T. (2007). National surveillance of psychosocial risk factors in the workplace: An international overview. *Work & Stress, 21*, 1-29

Einarsen, S., Hoel, H., Zapf, D., & Cooper, C. L. (2003). The concept of bullying at work: The European tradition. In S. Einarsen, H. Hoel, D. Zapf, & C. L. Cooper (Eds.), *Bullying and emotional abuse in the workplace: International perspectives in research and practice* (pp. 3-30). London: Taylor & Francis.

Einarsen, S., Raknes, B. I., & Matthiesen, S. B. (1994). Bullying and harassment at work and their relationships to work environment quality: An exploratory study. *European Work and Organizational Psychologist, 4*, 381-401.

Frese, M., & Zapf, D. (1988). Methodological issues in the study of work stress: Objective vs subjective measurement of work stress and the question of longitudinal studies. In C. L. Cooper

& R. Payne (Eds.), *Causes, coping and consequences of stress at work* (pp. 375-411). London: Wiley.

Gaab, J., Rohleder, N. Nater, U.M., & Ehlert U. (2005). Psychological determinants of the cortisol stress response: The role of anticipatory cognitive appraisal. *Psychoneuroendocrinology, 30*, 599-610.

Glendinning, P.M. (2001). Workplace bullying: Curing the cancer of the American workplace. *Public Personnel Management, 30*, 269-286.

Glyn, L.M., Christenfeld, N., & Guerin, W. (2007). Recreating cardiovascular responses with rumination: The effects of a delay between harassment and its recall. *International Journal of Psychophysiology, 66*, 135-140.

Goldberg, D.P., Gater, R., Sartorius, N., Ustun, T.B., Piccinelli, M., Gureje, O., & Rutter, C. (1997). The validity of two versions of the GHQ in the QHO study of mental illness in general health care. *Psychological Medicine, 27*, 191-197.

Goldberg, D.P., & Williams, P. (1988). *A user's guide to the General Health Questionnaire*. Windsor: NFER-Nelson.

Gump, B.B., & Matthews, K.A. (1999). Do background stressors influence reactivity to and recovery from acute stressors? *Journal of Applied Social Psychology, 29*, 469-494.

Hamilton, L.D., Newman, M.L., Delville, C.L., & Delville, Y. (2008). Physiological stress response of young adults exposed to bullying during adolescence. *Physiology & Behavior, 95*, 617-624.

Hansen, M.A., Hough, A., Persson, R., Karlson, B., Garde, A.H., & Ørbæk, P. (2006). Bullying at work, health outcomes, and physiological stress response. *Journal of Psychosomatic Research, 60,* 3-72.

Hart, P. M., Wearing, A. J., & Headey, B. (1995). Police stress and well-being: Integrating personality, coping and daily work experiences. *Journal of Occupational and Organizational Psychology, 68*, 133-156.Hoel, H., Faragher, B., & Cooper, C. L. (2004). Bullying is detrimental to health, but all bullying behaviours are not necessarily equally damaging. *British Journal of*

Guidance and Counselling, 32, 367-387.

Janoff-Bulman, R. (1992). *Shattered assumptions: toward a new psychology of trauma*. New York: The Free Press.

Kiecolt-Glaser, J., McGuire, L., Robles, T.F., & Glaser, R. (2002). Emotions, morbidity, and mortality: New Perspectives from psychoneuroimmunology. *Annual Review of Psychology, 53*, 83-107.

Kivimäki, M., Elovainio, M., & Vahtera, J. (2000). Workplace bullying and sickness absence in hospital staff. *Occupational and Environmental Medicine, 57,* 56-60.

Kivimäki, M., Virtanen, M., Vartia, M., Elovainio, M., Vahtera, J., Keltikangas-Järvinen, L. (2003). Workplace bullying and the risk of cardiovascular disease and depression. *Occupational and Environmental Medicine, 60,* 779-83.

Krieger, N., Chen, J.T., Waterman, P.D., Hartma, C., Stoddard, A.M., Quinn, M.M., Sorensen, G., & Barbeau, E.M. (2008). The inverse hazard law: Blood pressure, sexual harassment, racial discrimination, workplace abuse and occupational exposures in US low-income black, white and Latino workers. *Social Science and Medicine, 67*, 1970-1981.

Kuper, H., & Marmot, M. (2003). Job strain, job demands, decision latitude, and risk of coronary heart disease within the Whitehall II study. *Journal of Epidemiology & Community Health, 57,*147-53

Leymann, H. (1990). Mobbing and psychological terror at workplaces. *Violence and Victims, 5*, 119-126.

Lopez, A., Mathers, C., Ezzati, M., Jamison, D., & Murray, C. (2006). Global and regional burden of disease and risk factors, 2001: Systematic analysis of population health data. *Lancet, 367*, 1747-1757.

Matthiesen, S.B., & Einarsen, S. (2004). Psychiatric distress and symptoms of PTSD among victims of bullying at work. *British Journal of Guidance & Counselling, 32*, 335-356.

Mathers, C., Vos, T. & Stevenson, C. (1999). *The burden of disease and injury in Australia* [AIHW cat. no. PHE 17]. Canberra, Australia: Australian Institute of Health and Welfare.

Miller, G.E., & Blackwell, E. (2006). Turning up the heat: Inflammation as a mechanism linking chronic stress, depression, and heart disease. *Current Directions in Psychological Science, 15*, 269-272

Mikkelsen, E.G., & Einarsen, S. (2002). Basic assumptions and symptoms of post-traumatic stress among victims of bullying at work. *European Journal of Work and Organizational Psychology, 11*, 87-111.

Mizyed, I., Fass, S.S., & Fass, R. (2009). Review article: Gastro-oesophageal reflux disease and psychological comorbidity. *Alimentary Pharmacology & Therapeutics, 29*, 351-358.

Murray, C. J., & Lopez, A. D. (1997). Alternative projections of mortality and disability by cause 1990–2020: Global burden of disease study. *Lancet, 349*, 1498–1504.

Peter, R., & Siegrist, J. (2000). Psychosocial work environment and the risk of coronary heart disease. *International Archives of Occupational and Environmental Health, 73,* S41-S45

Pikhart, H., Bobak, M., Pajak, A., Malyutina, S., Kubinova, R., Topor, R., Sebakova, H., Nikitin, Y., & Marmot, M. (2004). Psychosocial factors at work and depression in three countries of Central and Eastern Europe. *Social Science & Medicine, 58*, 11475-1482.

Romanov, K., Appelberg, K., Honkasalo, M.L., & Koskenvuo, M. (1996). Recent interpersonal conflict at work and psychiatric morbidity: a prospective study of 15,530 employees aged 24–64. *Journal of Psychosomatic Research, 40*, 169-176.

Rugulies, R. Bültmann, U., Aust, B., & Burr, H. (2006). Psychosocial work environment and incidence of severe depressive symptoms. *American Journal of Epidemiology, 163,* 877-887.

Smith, T.W., & Ruiz, J.M. (2002). Psychosocial influences on the development and course of coronary heart disease: Current status and implications for research and practice. *Journal of Consulting and Clinical Psychology, 70*, 548-568.

Tuckey, M.R., Dollard, M.F., Hosking P.J., & Winefield, A.H. (2009). Workplace bullying: The role of psychosocial work environment factors. *International Journal of Stress Management, 16*, 215-232.

Vos, T., & Mathers, C.D. (2000). Burden of mental disorders: Australia and Global Burden of Disease studies. *Bulletin of the World Health Organization, 78*,427–438.

World Health Organization (2001). *The World Health Report 2001. Mental health: New understanding, new hope*. Geneva, Switzerland: World Health Organization.

World Health Organization (2003). *The World Health Report 2003. Shaping the future*. Geneva, Switzerland: World Health Organization.

World Health Organization (2008). *World Health Statistics 2008*. Geneva, Switzerland: World Health Organization.

Ylipaavalniemi, J., Kivimäki, M., Elovainio, M., Virtanen, M., Keltikangas-Järvinen, L., & Vahtera, J. (2005). Psychosocial work characteristics and incidence of newly diagonosed depression: A prospective cohort study of three different models. *Social Science & Medicine, 61*, 111-112.

Vartia, M. (1996). The sources of bullying – psychological work environment and organizational climate. *European Journal of Work and Organizational Psychology, 5*, 203-214.

Willness, C.R., Steel, P., & Lee, K. (2007). A meta-analysis of the antecedents and consequences of workplace sexual harassment. *Personnel Psychology, 60*, 127-162.

Zapf, D. (1999). Organisational, work group related and personal causes of mobbing/bullying at work. *International Journal of Manpower, 20*, 70-85.

Zapf, D., Knorz, C., & Kulla, M. (1996). On the relationship between mobbing factors, and job content, social work environment, and health outcomes. *European Journal of Work and Organizational Psychology, 5*, 215-237

Footnotes

[1] While the response rate was quite low, it is not uncommon in policing research in Australia. For example, a study of Victorian Police officers (Hart, Wearing, & Headey, 1995) achieved a similar response rate (23%) when the questionnaire was not accompanied by a letter from a senior police administrator.

Table 1

Inter-correlations Between Demographic Variables, Exposure to Negative Workplace Behavior, and

Cardiovascular and Mental Health Outcomes

Variable	1	2	3	4	5	6	7
1. Age							
2. Rank (0 = constable; 1 = Sergeant)	.45***						
3. Past exposure (T1)	.01	.02					
4. Current exposure (T2)	.10	.00	.46***				
5. High blood pressure (T2)[a]	.21**	.16*	.22**	.12			
6. Cardiac consultation (T2)[a]	.22**	.02	.22**	.18**	.31***		
7. GHQ-12 (Clinical Scores $\geq$ 4) (T1)[a]	-.01	.13	.24***	.18**	.14*	.01	
8. GHQ-12 (Clinical Scores $\geq$ 4) (T2)[a]	.11	.11	.13*	.23***	.12	.10	.27***

[a] Each outcome was coded using 0 to indicate non-cases and 1 to represent cases.

* $p < .05$.   ** $p < .01$.   *** $p < .001$

Table 2

Predicting High Blood Pressure at Time 2 from Exposure to Negative Workplace Behavior

Variable	B	$S.E.$	Wald	df	Exp(B)	95% C.I. for Exp(B) Lower	Upper
Step 1							
Age	0.07	.03	6.45*	1	1.07	1.02	1.13
Rank (0 = *Constable*, 1 = *Sergeant*)	0.57	.40	2.01	1	1.77	0.80	3.90
Step 2							
Age	0.07	.03	6.97**	1	1.07	1.02	1.13
Rank	0.68	.42	2.56	1	1.97	0.86	4.52
Past exposure (T1)	0.72	.21	11.48***	1	2.06	1.36	3.13
Current exposure (T2)	-.04	.22	0.28	1	0.96	0.63	1.48

Note. Model χ^2(2; $N = 212$) for Step 1 = 13.15, $p < .001$; Step 2 χ^2(2; $N = 212$) = 14.15, $p < .001$.

*p < .05   **p < .01   ***p < .001

Table 3

Predicting Cardiac Consultation at Time 2 from Exposure to Negative Workplace Behavior

Variable	*B*	*S.E.*	Wald	*df*	Odds ratio Exp(B)	95% C.I. for Exp(B) Lower	Upper
Step 1							
Age	0.11	.03	15.38***	1	1.11	1.05	1.17
Rank (0 = *Constable*, 1 = *Sergeant*)	−0.33	.38	0.75	1	0.72	0.34	1.52
Step 2							
Age	0.10	.03	14.13***	1	1.11	1.05	1.17
Rank	−0.23	.39	0.34	1	0.79	0.37	1.72
Past exposure (T1)	0.46	.21	4.53*	1	1.56	1.04	2.36
Current exposure (T2)	0.29	.21	2.00	1	1.34	0.89	2.01

Note. Model χ^2(2; $N = 212$) for Step 1 = 18.00, $p < .001$; Step 2 χ^2(2; $N = 212$) = 11.47, $p < .01$.

* $p < .05$ ** $p < .01$ *** $p < .001$

Table 4

Predicting GHQ 12 Time 2 (Clinical Scores ≥ 4) from Exposure to Negative Workplace Behavior

Variable	*B*	*S.E.*	Wald	*df*	Exp(B)	95% C.I. for Exp(B) Lower	Upper
Step 1							
Age	0.01	.02	0.28	1	1.01	0.97	1.07
Rank (0 = *Constable*, 1 = *Sergeant*)	0.33	.38	0.73	1	1.39	0.66	2.95
GHQ Time 1 (0 = *No case*, 1 = *Case*)	1.244	.36	12.04***	1	3.47	1.72	7.00
Step 2							
Age	0.00	.02	0.02	1	1.00	0.96	1.05
Rank	0.43	.39	1.19	1	1.54	0.73	3.08
GHQ (T1)	1.16	.38	9.24**	1	3.17	1.51	6.68
Past exposure (T1)	-0.27	.23.	1.42	1	0.76	0.49	1.19
Current exposure (T2)	0.54	.22	6.32*	1	1.76	1.13	2.62

Note. Model χ^2(3; *N* = 215) for Step 1 = 13.96, *p* < .001; Step 2 χ^2(2; *N* = 215) = 6.59, *p* < .05.

* *p* < .05   **p < .01   ***p < .001