International Journal of Emergency Mental Health and Human Resilience, Vol. 15, No. 4 pp. 267-276 © 2013 Chevron Publishing ISSN 1522-4821

Work Hours and Absenteeism Among Police Officers

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Abstract: *In this study, the cross-sectional association of paid work hours with episodes of work absence was examined in a cohort of police officers. Study subjects were participants from the Buffalo Cardio-Metabolic Occupational Police Stress (BCOPS) study examined between 2004 and 2009. Among 395 study participants with complete data, day-by-day work history records during the one-year period prior to date of examination were used to determine episodes of one-day and three day work absence. The Negative binomial regression analysis was used to examine rate ratios (RR) of work absence. Analyses were also stratified by gender. A one-hour increase in total work hours was associated with 5% reduction in rate of one-day work absence (RR = 0.95, 95% CI: 0.92 – 0.98) and with 8% reduction in rate of three-day work absence (RR = 0.92, 95% CI: 0.89 – 0.95). The association of total work hours with episodes of one-day work absence was significant only in men while the association with episodes of three-day work absence was evident in men and women. In conclusion, in this cohort of police officers, work hours were negatively associated with both durations of work absence (one-day, ≥ 3 consecutive days).* [International Journal of Emergency Mental Health and Human Resilience, 2013, 15(4), pp. 267-276].

Key words: *police officers, work hours, sickness absence, work history*

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Long work hours are common in the United States (Caruso, 2006) especially among first responders such as police officers (Vila, 2006). Numerous studies suggest positive association between long work hours and adverse health outcomes including injury, obesity, diabetes, hypertension, cardiovascular diseases, fatigue, stress, depression, and general health complaints (Gu et al., 2012; Charles et al., 2012; Caruso, 2006; Dembe et al., 2005; van der Hulst, 2003; Liu et al., 2002; Lipscomb et al., 2002; Nylén et al., 2001; Park et al., 2001; Shields, 1999). Long work hours have been hypothesized to negatively impact health by impairing recovery time (mentally and physiologically) from work, prolonging exposure to adverse work conditions, and modifying lifestyle behaviors including physical inactivity, reduced sleep, limited involvement in family functions, and increasing the tendency for alcohol and tobacco use (Ala-Mursula et al., 2006; Caruso et al., 2006). In addition, these adverse influences on health are thought to be more profound in women than in men (Artazcoz & Gutiérrez Vera, 2012; Ala-Mursula et al., 2006; Ala-Mursula et al., 2002).

Although there is a substantial body of research linking long work hours to negative health outcomes, comparatively few studies have examined the association of work hours with absenteeism (stress related or sickness absence). In addition, these studies were frequently based on self-reported work hours and/or absenteeism. In the present cross-sectional study, we utilized objective payroll work history records to estimate both work hours and absenteeism and examine their association among a cohort of urban police officers who generally are at high risk for a variety of chronic diseases and are exposed to long and erratic work hours. Gender stratified analyses were also conducted to assess differences in the association of interest between male and female police officers.

METHODS

Design and Study participants

The Buffalo Cardio-Metabolic Occupational Police Stress (BCOPS) study was a cross-sectional study aimed at investigating the associations of occupational stressors with psychological and physiological health of police officers. A total of 710 police officers who worked in the Buffalo Police Department in New York were invited to participate, of which 65.4% (n = 464) officers agreed and were examined between June 4, 2004 to October 2, 2009. The study was approved by the Institutional Review Board of the State University of New York at Buffalo, and the National Institute for Occupational Safety and Health Institutional Review Board (NIOSH IRB). Further details about the study design are reported elsewhere (Hartley et al., 2011, Violanti et al., 2012).

Work hours and episodes of work absence

For this study, work hours per week served as the exposure variable. The outcome of interest consisted of two types of numeric variables representing the count of episodes of one-day and ≥ 3 consecutive days of work absence. Both the exposure and outcome variables were determined using objective work history records of the participants during the 1-year period prior to date of examination. The work history data obtained from the payroll department contained a day-by-day account of activities for each officer including the start time of work, the type of activity (regular work, court work, overtime work), the type of leave (weekend, sickness, work-related injury, vacation), and the number of hours worked on each activity.

The daily hours worked by each participant during the one-year period were partitioned into regular time hours and overtime hours. Regular time hours refer to the hours worked during the regularly scheduled shift as each officer was assigned to 10-hour non-rotating shifts. On the other hand overtime hours, as defined here, may not have the usual meaning of > 40 hours per week. Examination of the payroll work history data reveals that most participants tend to have overtime work hours just prior to or after their regularly scheduled work period (i.e., coming 30-minutes or an hour earlier than the regular start time or leaving 30-minutes or an hour later than the end of regularly scheduled time). In addition, overtime also included hours at court as well as other hours worked outside the regular schedule (e.g., working when scheduled off). Weekly estimates (hours per week) of regular hours, overtime hours, and total (regular + overtime) hours were then derived.

For each work day, the occurrence of work absence due to sickness was identified when the payroll record indicated that an officer was paid but was off-duty due to sickness. We defined a particular work absence as a separate episode if it started following at least one day of full time regular work from the previous sick leave episode. Using this definition, a count of episodes of one-day and three-day sick leave was determined for each participant.

Covariates

On the examination date of the BCOPS study, anthropometric and biological measurements were assessed by trained clinic personnel. In addition, questionnaires were administered to collect demographic and lifestyle characteristics including age, education, marital status, number of children, race/ethnicity, years of police service, rank, smoking, sleep duration, physical activity, and alcohol consumption. Hours of sleep and physical activity were assessed using the Seven-Day Physical Activity Recall questionnaire developed in the Stanford Five-City Project (Sallis et al., 1985). Further details on covariate assessment were reported elsewhere (Charles et al., 2011).

Statistical Analysis

Of the 464 BCOPS study participants, 395 (289 men and 106 women) had work history data during the 1-year period and these subjects were used for the current analyses. The two outcome variables consisted of count data with over-dispersion and hence the negative binomial regression analysis was used as the preferred method to estimate rate ratios (RR) of work absence and their 95% confidence intervals that were associated with a one-hour increase in work hours. In order to examine the role of gender on associations of interest, stratified analyses by gender were conducted. Models were adjusted for potential covariates including age, gender (except when stratifying), race/ethnicity, rank, marital status, number of children, smoking, body mass index, alcohol consumption and sleep hours. The criterion for selection of covariates was relaxed in order to capture all potential confounders. Hence, a covariate was selected for adjustment if associated with either the dependent or exposure variable and this assessment was done separately by type of outcome and gender. Alternative statistical methods were also employed to examine the association of work hours with duration of sickness absence. These included comparing mean episodes of each type of work absence across tertiles of work hours and regression analyses to assess linear trend. For all tests, statistical significance was assessed at the 5% level and all analyses were conducted using the SAS system, version 9.3.

RESULTS

Demographic and lifestyle characteristics

The study sample (Table 1) consisted of 73% males and the majority was white (77%), married (73%), with a rank of patrol officer (71%), never smoked (61%) and overweight (82%). The mean age was 41.4 years (range: 27-66). Male officers had longer years of service (15.3 years), higher BMI (30.5 kg/m^2) and alcohol consumption (6 drinks per week) and more children compared to their female counter parts. The work hours ascertained from the payroll work history records do not include paid vacation time, sickness absence or injury leave. Hence the estimate of total work hours from the work history data (33 hrs./wk.) was smaller compared to self-reported hours (43 hrs./wk.).

Episodes of work absence

The count of one-day work absence during the past year ranged from zero to 19 with women showing slightly more frequent episodes (2.7 ± 3.1) compared to men (1.8 ± 3.0). The episodes of three-day work absence (range: 0-12) were also significantly higher for women (1.8 ± 2.7) compared to men (1.2 ± 1.9). Examination of episodes of work absence in relation to other demographic and lifestyle factors (Table 2) revealed that current smokers and patrol officers had the highest mean episodes of one-day work absence while older age (r = -0.25) and longer years of service (r = -0.35) were associated with lower episodes of one-day work absence. On the other hand, episode of three-day work absence was lowest for those with ≥ 4 years of education. Alcohol consumption was positively correlated (r = 0.12) with three-day work absence.

Work hours and episode of one-day work absence

The rate ratios (RR) of one-day work absence for men and women combined (Table 3) shows that, after accounting for potential covariates, a one-hour increase in overtime hours (RR = 0.92, 95% CI: 0.87 – 0.98), and total hours (RR = 0.95, 95% CI: 0.92 – 0.98) was associated with 8% and 5% reduction in rate of one-day work absence, respectively. Results from stratified analyses by gender (Tables 4 and 5) indicate longer total work hours were significantly associated with lower rate of one-day work absence in men (RR = 0.95, 95% CI: 0.92 – 0.99) but not in women (RR = 0.97, 95% CI: 0.92 – 1.01).

Work hours and episodes three-day work absence

After adjusting for covariates, a one-hour increase in

Table 1.
Demographic and life style characteristics of study participants, BCOPS Study, 2004-2009

	Men n=289		Women n=106		All n=395	
Characteristics	N	% (±SD)	N	% (±SD)	N	% (±SD)
Age, years						
<40	119	41.2	42	39.6	161	40.8
40-49	128	44.3	55	51.9	183	46.3
≥50	42	14.5	9	8.5	51	12.9
Race/Ethinicity[+]						
White	222	78.4	76	71.7	298	76.6
Black	54	19.1	30	28.3	84	21.6
Hispanic	7	2.5	0	0.0	7	1.8
Education[+]						
≤High school/GED	37	12.9	4	3.8	41	10.4
College <4 yrs	157	54.7	66	62.3	223	56.7
College 4+ yrs	93	32.4	36	34.0	129	32.8
Marital status[+]						
Single	25	8.7	26	24.5	51	12.9
Married	226	78.8	61	57.6	287	73.0
Divorced	36	12.5	19	17.9	55	14.0
Smoking status[+]						
Current	38	13.2	27	26.2	65	16.6
Former	58	20.1	31	30.1	89	22.8
Never	192	66.7	45	43.7	237	60.6
Rank						
Patrol officer	195	67.7	84	79.3	279	70.8
Sergeant/Lieutenant	43	14.9	12	11.3	55	14.0
Captain/Detective	50	17.4	10	9.4	60	15.2
Body mass index, kg/m^{2+}						
Normal (<25)	19	6.6	51	48.6	70	17.8
Overweight (25-29)	127	43.9	37	35.2	164	41.6
Obese (30+)	143	49.5	17	16.2	160	40.6
Age, years	289	41.5 ± 6.9	106	41.1 ± 5.7	395	41.4 ± 6.6
Years of service, years[+]	288	15.3 ± 7.2	106	13.6 ± 6.5	394	14.8 ± 7.0
Body mass index, kg/m^{2+}	289	30.5 ± 4.2	105	26.1 ± 4.7	394	29.3 ± 4.8
No. of alcohol drinks/week[+]	286	6.3 ± 10.6	103	3.6 ± 6.0	389	5.6 ± 9.7
Average hours of sleep/day	288	6.2 ± 1.1	105	6.3 ± 1.2	393	6.2 ± 1.2
Hours of physical activity/week[¥]	287	14.8 ± 12.9	105	17.2 ± 14.1	392	15.4 ± 13.3
No. of children[+]	274	2.3 ± 1.5	104	1.8 ± 1.5	378	2.2 ± 1.5
Self-reported hours at regular shift per week	286	39.8 ± 4.7	106	39.8 ± 2.4	392	39.8 ± 4.2
Self-reported overtime hours per week[+]	281	3.7 ± 5.6	101	2.1 ± 4.1	382	3.3 ± 5.3
Self-reported hours per week at second job	289	5.3 ± 7.9	106	2.0 ± 5.2	395	4.4 ± 7.4
Total work hours per week[1,+]	289	32.8 ± 6.6	106	31.4 ± 4.9	395	32.4 ± 6.2
Regular time hours per week[1]	289	29.6 ± 5.4	106	29.7 ± 4.1	395	29.6 ± 5.1
Overtime hours per week[1,+]	289	3.2 ± 3.0	106	1.8 ± 2.3	395	2.8 ± 2.9

Results for the continuous variables are means ± SD. [+]Significant differences between men and women based on $\chi 2$ tests of independence or Fisher's exact for categorical variables and ANOVA for continuous variables (p-values <0.05). [¥]Physical activity hours include occupational, household and leisure time activities.
[1]Work hours derived from payroll work history data.

Table 2.
Associations of demographic and life style characteristics with episodes of work absence.

		One-day work absence		≥3 day work absence	
Characteristics	N	Mean ±SD	p-value	Mean ±SD	p-value
Gender					
Women	106	2.7 ± 3.1	0.008	1.8 ± 2.7	0.007
Men	289	1.8 ± 3.0		1.2 ± 1.9	
Race/Ethinicity+					
White	298	2.3 ± 3.1	0.056	1.3 ± 2.0	0.409
Black	84	1.5 ± 2.7		1.5 ± 2.5	
Hispanic	7	0.9 ± 1.2		2.1 ± 3.3	
Education+					
≤High school/GED	41	1.7 ± 2.7	0.408	1.1 ± 1.4	0.004
College <4 yrs	223	2.3 ± 3.2		1.6 ± 2.4	
College 4+ yrs	129	1.9 ± 2.8		1.0 ± 1.7	
Marital status+					
Single	51	1.9 ± 2.4	0.855	1.6 ± 2.6	0.448
Married	287	2.1 ± 3.1		1.2 ± 2.1	
Divorced	55	2.1 ± 3.6		1.5 ± 2.1	
Smoking status+					
Current	65	2.8 ± 3.5	0.035	1.8 ± 2.2	0.160
Former	89	1.6 ± 2.8		1.3 ± 2.1	
Never	237	2.1 ± 3.0		1.2 ± 2.1	
Rank					
Patrol officer	279	2.6 ± 3.3	0.001	1.3 ± 1.9	0.547
Sergeant/Lieutenant	55	0.8 ± 1.7		1.6 ± 2.7	
Captain/Detective	60	0.8 ± 1.7		1.2 ± 2.6	
Age, years	395	r = -0.25	0.001	r = 0.08	0.105
Years of service, years	394	r = -0.33	0.001	r = 0.09	0.075
Body mass index, kg/m^2	394	r = -0.07	0.179	r = -0.10	0.056
No. of alcohol drinks/week	389	r = 0.04	0.461	r = 0.12	0.020
Average hours of sleep/day	393	r = 0.08	0.096	r = 0.06	0.201
Hours of physical activity/week	392	r = 0.01	0.801	r = -0.03	0.588
No. of children+	378	r = -0.07	0.178	r = 0.09	0.075

Results for the categorical covariates are means ± SD. Results for the continuous covariates are correlation coefficients (r).

overtime hours (RR = 0.94, 95% CI: 0.88 – 0.99) and total hours (RR = 0.92, 95% CI: 0.89 – 0.95) was associated with 6% and 8% reduction in rate of three-day work absence, respectively. Stratified analyses by gender (Tables 4 and 5) show that total work hours were inversely associated with three-day work absence in both men (RR = 0.95, 95% CI: 0.92 – 0.99) and women (RR = 0.89, 95% CI: 0.85 – 0.94).

Results from the alternative statistical analyses (analyses of covariance) are displayed in Figure 1 which shows covariate adjusted mean episodes of work absence by tertiles of total work hours. The data indicates that among men, the average episode of one-day work absence was largest for those in the lowest tertile and that all pairwise mean comparisons across the three categories were significant in men but not in women. The decreasing linear trends in one-day work absence with increasing work hours were not significant at the 5% level (trend p-value = 0.174 for men, 0.282 for women). A significant reduction in episodes of three-day

Table 3.
Rate ratios (RR) of episodes of work absence (n=395) in relation to work hours.

	Unadjusted		Age-adjusted		Multivariable-adjusted	
Characteristics	RR	95% CI	RR	95% CI	RR	95% CI
	Episodes of work absence (one-day)[1]					
Overtime hours per week	0.91	0.86 – 0.96	0.90	0.86 – 0.95	0.92	0.87 – 0.98
Total work hours per week	0.96	0.92 – 0.99	0.94	0.91 – 0.98	0.95	0.92 – 0.98
	Episodes of work absence (≥3 consecutive days)[2]					
Overtime hours per week	0.93	0.87 – 0.98	0.92	0.87 – 0.98	0.94	0.88 – 0.99
Total work hours per week	0.91	0.88 – 0.93	0.91	0.88 – 0.93	0.92	0.89 – 0.95

[1]For the multivariable-adjusted model, adjustment was made for age, gender, race, smoking status, rank, and sleep hours.
[2]Adjustment was made for age, gender, rank, education, BMI, alcohol consumption and number of children.

Table 4.
Rate ratios (RR) of episodes of work absence in relation to work hours among men (n=289).

	Unadjusted		Age-adjusted		Multivariable-adjusted	
Characteristics	RR	95% CI	RR	95% CI	RR	95% CI
	Episodes of work absence (one-day)[1]					
Overtime hours per week	0.92	0.86 – 0.98	0.90	0.85 – 0.96	0.94	0.88 – 1.00
Total work hours per week	0.95	0.91 – 0.99	0.94	0.90 – 0.98	0.95	0.92 – 0.99
	Episodes of work absence (≥3 consecutive days)[2]					
Overtime hours per week	0.93	0.86 – 0.99	0.93	0.86 – 0.99	0.94	0.88 – 1.00
Total work hours per week	0.91	0.88 – 0.95	0.92	0.88 – 0.95	0.95	0.92 – 0.99

[1]For the multivariable-adjusted model, adjustment was made for age, race, rank, and alcohol consumption. [2]Adjustment was made for age, race, rank, education, alcohol consumption, sleep hours, and number of children.

work absence across increasing tertiles of total work hours in both men (trend p-value <0.0001) and women (trend p-value <0.0001) are shown.

DISCUSSION

The study examined the association of paid work hours and work absenteeism (one-day, ≥ 3 consecutive days) among police officers and assessed the impact of gender on the association. Both variables of interest (work hours and absenteeism) were derived based on objective day-to-day work-history records of the officers for a one-year period. Although the work history data do not indicate the type of sickness or its severity, it is an administrative policy to provide certification from a physician when the work absence lasts three consecutive days or longer. Hence absence of three or more consecutive days was treated as proxy measure of physician-certified sickness absence. It is possible that one-day work absences included both stress-related work absence and short term absence due to physical sickness. On average, women had approximately 3-episodes of one-day work absence and 2-episodes of three-day work absence per year while the estimates for men were 2 and 1-episodes respectively. During the 1-year period, over half of the study

Table 5.
Rate ratios (RR) of episodes of work absence in relation to work hours among women (n=106).

	Unadjusted		Age-adjusted		Multivariable-adjusted	
Characteristics	RR	95% CI	RR	95% CI	RR	95% CI
	Episodes of work absence (one-day)[1]					
Overtime hours per week	0.94	0.84 – 1.05	0.94	0.85 – 1.05	0.96	0.86 – 1.07
Total work hours per week	0.98	0.93 – 1.03	0.97	0.93 – 1.02	0.97	0.92 – 1.01
	Episodes of work absence (≥3 consecutive days)[2]					
Overtime hours per week	0.98	0.87 – 1.09	0.96	0.86 – 1.08	0.96	0.85 – 1.09
Total work hours per week	0.89	0.84 – 0.94	0.89	0.85 – 0.94	0.89	0.85 – 0.94

[1]For the multivariable-adjusted model, adjustment was made for age, race, rank, marital status, BMI, and sleep hours.
[2]Adjustment was made for age, race, rank, and sleep hours.

participants experienced one or more episodes of one-day or three-day work absences.

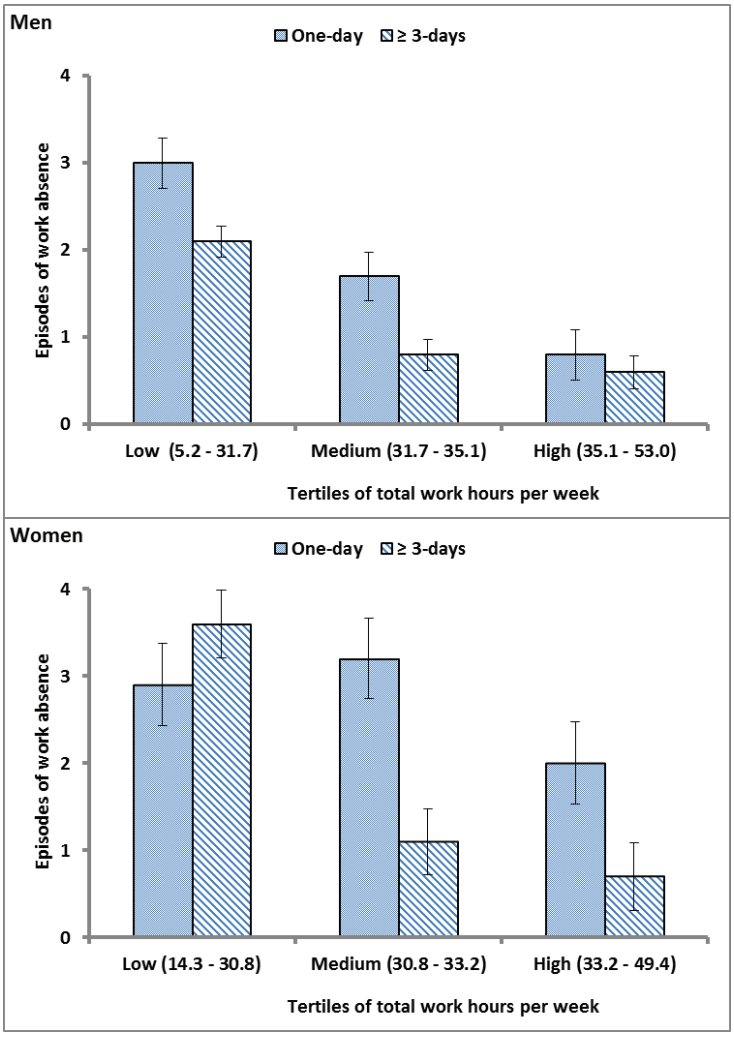
After adjusting for a number of demographic and life style factors, results showed that work hours were inversely and significantly associated with episodes of one-day work absence (in men) and episodes of three-day work absence in both genders. For the whole cohort, a one-hour increase in total work hours was associated with 5% reduction in rate of one-day work absence (RR = 0.95, 95% CI: 0.92 – 0.98) and with 8% reduction in rate of three-day work absence (RR = 0.92, 95% CI: 0.89 – 0.95). The magnitude of the inverse association between work hours and episodes of one-day work absence were similar regardless of gender (interaction p-value > 0.680) but the significance of the association did vary by gender. On the other hand, the effect of work hours on three-day work absence although evident in both genders appears to be more pronounced among women than men (interaction p-value = 0.276); a one-hour increase in total work hours were associated with 11% reduction in rate of three-day work absence in women and with 5% reduction in men.

Literature on work hours and absenteeism is scarce but the inverse association from the current analyses is consistent with one previous report. A prospective study of public sector employees in Finland (Ala-Mursula et al., 2006) reported that long paid work hours were associated with lower rates of self-certified sickness absence (≤ 3 days) among both men and women. Among women the rate of absenteeism for those who worked 40 to 50 hours per week was 8% lower (RR = 0.92, 95% CI: 0.88 – 0.96) compared to those who worked less than 40 hours per week, while among men the rate of work absence was 21% smaller (RR = 0.79, 95% CI: 0.73 – 0.85). The associations of paid work hours with medically certified sickness absence (>3 days) was not significant in both men (RR = 0.97, 95% CI: 0.93 – 1.02) and women (RR = 0.90, 95% CI: 0.82 – 1.00). However, the study reported that total work hours (paid + domestic + commuting) were associated with higher rates of medically certified sickness absence. Other studies (Van der Hulst, 2003; Spurgeon et al., 1997, Sparks et al., 1997) also point out that the effects of work hours depend on the type of health outcome measured; positive association with health complaints, CVD, diabetes, etc. but inverse association with sickness absenteeism.

Work absenteeism is not a simple function of ill health or other individual factors such as job dissatisfaction (Kristensen T., 1991, Eriksen et al., 2003; Ala-Mursula et al., 2006, Duijts et al., 2007, Foss et al., 2011, Fekedulegn et al., 2013). In fact, the causes of work absenteeism could be multifactorial and complex in nature as it may involve a number of interacting physical and psychosocial conditions at individual, organizational, and household levels. These additional factors may include perceived control over working hours, job demand and control, coping method, social support, burnout, shift schedule, psychosomatic and psychological problems, marital status, and medication use.

The results from the current analyses give rise to a number of questions. For example, how should these findings be interpreted and how should they be related to existing knowledge about the links between long work hours and

Figure 1.
Mean episodes of one-day and three-day work absence by tertiles of total work hours for male and female officers. The numbers of subjects in the low, medium and high categories were 96, 97, 96 respectively for men and 35, 36, and 35 for women.



health or absenteeism? The answers to such questions are of importance from a scientific viewpoint. Some possible explanations for the inverse association of work hours with absenteeism could include (1) those who work long hours could be committed employees and hence may work while ill or take sick leave only when absolutely necessary (Ala-Mursula et al., 2006), (2) those employees engaged in long work hours may be the healthiest (healthy worker effect) and hence may contribute to the inverse association between long work hours and low rates of absence, and (3) long hours may result in overtime pay and hence officers may use such opportunity to gain additional income. Our data however do not appear to support the healthy worker hypothesis. The proportion of officers who self-reported their general health as excellent or very good did not differ (p=0.376) by tertiles of work hours (90.1%, 94.7%, and 92.4% for low, moderate, and high work hours respectively). The prevalence of metabolic syndrome, a clustering of CVD risk factors, was not significantly different (p=0.159) across tertiles of work hours (23.4%, 25.2%, and 33.3% for low, moderate, and high work hours respectively). The proportion of officers with BMI <25kg/m^2 was significantly lower (p=0.031) among those in the highest tertile of work hours (9.9%) compared to those in the middle (24.4%) and lowest (19.1%) tertiles.

In addition, we conducted analyses of work absence and regular time work hours (excluding overtime hours) and the result showed significant associations with one-day (RR = 0.96, 95% CI: 0.92 – 0.99) and three-day (RR = 0.89, 95% CI: 0.86 – 0.93) work absence. This may suggest that the inverse association may not be due to overtime pay (income).

The study has limitations and strengths. Shortcomings include the cross-sectional study design which limits casual inference. The type of sickness was not available. The study sample consisted of only police officers which limits external validity of the results. Due to lack of variability in self-reported work hours (95% of the officers self-reported working exactly 40 hrs/wk), we were not able to examine the association of self-reported hours and work absence. One of the strengths of this study is the use of routinely collected objective data detailing day-to-day work history records from which work hours and sickness absence were ascertained. The concept of one-day sickness absence includes absences due to stress or fatigue (the so called "mental health" day off from work) which usually lasts for a shorter duration whereas absences lasting three or more consecutive days are more likely related to sickness absence with physical symptoms.

In summary, this study showed that officers working longer hours were less likely to have one-day and three-day work absences. The findings are in contrast with prior studies that indicate adverse health outcomes associated with long work hours. This study adds to the body of knowledge regarding the association of work hours with absenteeism among high stress occupations. Determination of the underlying reasons for the inverse association requires further studies with larger samples and a prospective design that would enable estimation of the true incidence rates of absenteeism associated with long work hours and also identification of potential mediators and effect modifiers of the association. Future studies ought to consider commuting and domestic work hours in addition to paid work hours when assessing effects on absenteeism.

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