Effect of Mandatory and Voluntary Overtimes Hours on Stress among 9-1-1 Telecommunicators

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Abstract

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9-1-1 telecommunicators are frequently exposed to indirect traumatic events that can impact their mental and physical health. Telecommunicators are also commonly required to work overtime with rotating shifts. Evidence from studies in other industries suggested the harmful effects of overtime on the health and wellbeing of workers such as musculoskeletal injuries, obesity, absenteeism, burnout, job satisfaction, fatigue, intent to leave, emotional disorders, and lack of time for housework. However, there is limited research on the impact of overtime hours, especially mandatory overtime hours on 9-1-1 telecommunicators' stress. This study aimed to examine the relationship between overtimes hours—mandatory and voluntary—and level of stress symptoms among 9-1-1 telecommunicators. Secondary data analysis was conducted for data collected from surveys as part of a larger intervention study. Linear mixed-effects regression was applied to explore the association of overtime hours on the C-SOSI score while considering

the ‘call centers’ variable as a random effect. Of the 441 participants, 50.2% reported that they were required to work overtime (mandatory overtime) and among those who worked mandatory overtime, the mean mandatory overtime hours were 7.52 (SD=12.71) in the past month. The percentage of 9-1-1 telecommunicators who worked voluntary overtime was 61.06% and the mean voluntary overtime hours were 11.73 (SD=17.57). From the hypothesis test, this study found that mandatory overtime hours were associated with an increase in the self-reported symptoms of stress (β = .41, p=.002), whereas no significant relationship was found between voluntary overtime and the level of stress symptoms. Further studies should focus on developing interventions to reduce and manage stress, and strategies to retain and recruit staff are needed to reduce the overtime hours, especially mandatory overtime.

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Introduction

9-1-1 telecommunicators are the "heartbeat" of the nation's 911 system (911dispatcheredu.org, n.d.-b) and play an important role in emergency situations for the public as they receive and respond to incoming emergency and non-emergency calls by providing medical instruction to callers while dispatching first responders to the scene (911dispatcheredu.org, n.d.-a). Due to the nature of work duty, 9-1-1 telecommunicators are frequently exposed to indirect traumatic events that can impact their mental and physical health. 9-1-1 telecommunicators frequently experience feelings of helplessness, frustration, and horror due to the calls they receive and those feelings could potentially lead to the development of Post-Traumatic Stress Disorder (PTSD) (Pierce & Lilly, 2012; Troxell, 2008).

Telecommunicators work long and non-typical working shifts. The Fair Labor Standards Act (FLSA) defines overtime as working more than 40-hours per week (U.S. Department of Labor, n.d.). However, the law does not limit the maximum number of hours employers can require their employees to work if employees are paid at a rate of time and a half for any hours worked beyond the regularly scheduled 40-hours work. Mandatory overtime is overtime that employees are forced to work under the condition of being fired when it is refused. In a survey study conducted in 79 emergency communication centers in the state of Illinois, 80.9% of telecommunicators were required to work mandatory overtime while only 18.9% of telecommunicators were asked to work overtime voluntarily (Troxell, 2008). Several studies on the harmful effects of overtimes hours were found in nursing. While no research found about how overtime impact on the health of 9-1-1 telecommunicators, there are several previous studies in nursing that report how long working hours (e.g.12 hours/shift and more than 40 hours/week) is adversely related to the health and wellbeing of nurses such as musculoskeletal

injuries, obesity, absenteeism, burnout, job satisfaction, fatigue, intent to leave, emotional disorders, and lack of time for housework (Bae & Fabry, 2014; Barker & Nussbaum, 2011; Han, Trinkoff, Storr, & Geiger-Brown, 2011; Portela, Rotenberg, & Waissmann, 2005; Rajbhandary, 2010; Stimpfel, 2015; Stimpfel, Sloane, & Aiken, 2013; Trinkoff, Le, Geiger-Brown, Lipscomb, & Lang, 2006). Even though those research are from nursing, some of the negative impacts of overtime maybe could occur to 9-1-1 telecommunicators because 9-1-1 telecommunicators also work for irregular shifts (e.g. day, evening, night shifts) and deal with life-threating situations frequently. Even though there are diverse negative impacts on the health of overtime, overtime can bring benefits such as additional income to 9-1-1 telecommunicators (LeBlanc, 2017). Especially 9-1-1 telecommunicators who can work overtime voluntarily feel more satisfied because they are able to control their time (Taylor, Gardner, Clark, & McCombs, 2005).

However, there is limited research on the impact of overtime hours, especially mandatory overtime hours on 9-1-1 telecommunicators' stress levels. In addition, there is a limited understanding of whether 9-1-1 telecommunicator's perceived benefits of working overtime hours are associated with perceived 9-1-1 telecommunicators' stress levels.

This study was to examine the relationship between overtimes hours—mandatory and voluntary—and level of self-reported stress symptoms among 9-1-1 telecommunicators across the US and Canada. Specific aims for this study are as follows:

- Aim 1: Describe the voluntary and mandatory overtimes hours and level of stress among 9-1-1 telecommunications.
- Aim 2: Examine the relationship between the level of stress symptoms and overtime hours among 9-1-1 telecommunicators. Mediating and/or moderating factors will be

considered such as gender, having dependents, country, and perceived benefit of overtimes hours.

Literature Review

Work-related stress for 9-1-1 telecommunicators. Work stress can be defined as "the harmful physical and emotional responses that occur when the requirements of the job do not match the capabilities, resources, or needs of the worker," according to the National Institute for Occupational Safety and Health (NIOSH) (Sauter et al., 1999). Due to the nature of the work of 9-1-1 telecommunicators, they are exposed to frequent traumatic events that induce feelings such as fear, helplessness, or horror (Pierce & Lilly, 2012) even though the traumatic events they are dealing with are physically distant. Sources of stress for 9-1-1 telecommunicators include exposure to traumatic events, high work pressure and having to work rotating shifts (including night shifts), having to adapt to new technologies, frequent overtime hours, and lack of reward and incentives (LeBlanc, 2017).

Overtime hours and its health effects. FLAS defines overtime as working more than 40 hours a week and 9-1-1 telecommunicators follow the requirement of FLAS. There is no specific limit on the maximum overtime hours per day or week under this law as long as the overtime hours above 40-hour regular schedule are paid with 150% of the regular rate (U.S. Department of Labor, n.d.). Because there is scare research about overtime for 9-1-1 telecommunicators, no research was identified that defined overtime hours for 9-1-1 telecommunicators. A study by Wheatley (2017) reported that studies on overtime have an inconsistent definition of overtime, which makes it difficult to assess the frequency and result of overtime for nurses.

One study reported that 81% of 9-1-1 telecommunicators had mandatory overtime (Troxell, 2008). Mandatory overtime is required in many call centers to meet the center's ability to answer calls in a situation of understaffing. Even though overtime is a source of additional income, mandatory overtime causes staff to leave the job (Taylor et al., 2005). In an online journal article, it was reported that an Ingham County dispatcher in Michigan, worked 1121 hours overtime in 2016, 955 hours in 2015, and 967 hours in 2014, consecutively (LeBlanc, 2017), which cost about 25 % of all payroll annually. Long hours of overtime are not uncommon in other 911 call centers (Ballou, 2016; Bowen, n.d.; LeBlanc, 2017; Moore, 2019). Repetitive overtime work can alter life and work balance and makes dispatchers leave the job (Ballou, 2016). The need for overtime in 9-1-1 call centers is mainly due to staff shortage and difficulties in recruitment and retention of qualified and long term employees (Dunaway, 2013; LeBlanc, 2017; Moore, 2019).

Broadly, the adverse effects of overtime on workers have been reported in many studies from diverse industries. A report from the U.S Department of Health and Human Services reviewed previously published research from diverse industries and summarized that overtime was associated with increased injury rates, illnesses, or increased mortality as well as feelings of decreased alertness and increased fatigue, lower cognitive function, declines in vigilance on task measures (Caruso, Hitchcock, Dick, Russo, & Jennifer Schmit, 2004). Studies conducted on a nationally representative sample of working adults in the US from other industries also reported that injury risks increases as hours increase among construction workers (Dembe, Erickson, Delbos, & Banks, 2005; Dong, Wang, & Largay, 2015). A study has shown the negative effects of overtime work on sleep and fatigue (Dahlgren, 2006).

Studies from nursing reported findings indicating the relationship between overtime and nurses' health and well-being. Nurses work with rotating schedules (e.g. day, evening, and night shifts) like 9-1-1 telecommunicators. A study on nurses' work hours and schedule reported that mandatory overtime was significantly related to the increase of shoulder musculoskeletal disease (Trinkoff et al., 2006). A systematic literature review reported that working overtime hours (e.g. 12-hours shifts) have negatively associated with various nurses' health outcomes such as musculoskeletal disorders/injuries, back pain, illness, overweight, alcohol consumption, burnout, fatigue, emotional disorders, etc. (Bae & Fabry, 2014). These findings may be applied to 9-1-1 telecommunicators because characteristics of the nursing work environment are similar to the one of 9-1-1 telecommunicators (e.g. long work hours, shift work) (National Institute for Occupational Safety and Health, 2008).

Other factors. It is important to consider that the relationship between overtime hours and the stress among 9-1-1 telecommunicators might be mediated with factors such as incentives, benefits, incomes, social support, and having children or not (Chait Barnett, 2006; Ganster, Rosen, & Fisher, 2018). Studies from nursing reported that one of the reasons for working overtime is for additional income (Bae, Brewer, & Kovner, 2012; Lobo, Ploeg, Fisher, Peachey, & Akhtar-Danesh, 2018). Women tend to have more responsibility for childcare which reduces the time for recovery from work (Caruso et al., 2004; Troxell, 2008). However, there is a lack of research on 9-1-1 dispatching which is a female dominant job. Also, women with children may be more likely to want to work overtime due to the financial need for childcare (Bae et al., 2012; Lobo et al., 2018) or prefer flexible shifts (e.g. choosing 8- hours or 12-hours shifts) to accommodate child care (Taylor et al., 2005).

Conceptual Framework

Adapting from conceptual frameworks of Dembe et al. (2005) and Schuster & Rhodes (1985) as well as based on literature review, a conceptual framework for this study was developed (Figure 1). This framework describes how the impact of overtime hours on 9-1-1 telecommunicator's symptoms of stress is moderated or mediated by individual characteristics and perceived benefit over working overtime hours. Following hypothesis are proposed for this study:

1. Mandatory and voluntary overtime hours are associated with an increased level of symptoms of stress (C-SOSI)
2. The level of stress symptoms and overtime hours are related to the perceived benefits of overtime hours. Perceived benefits are hypothesized to function as a mediator.

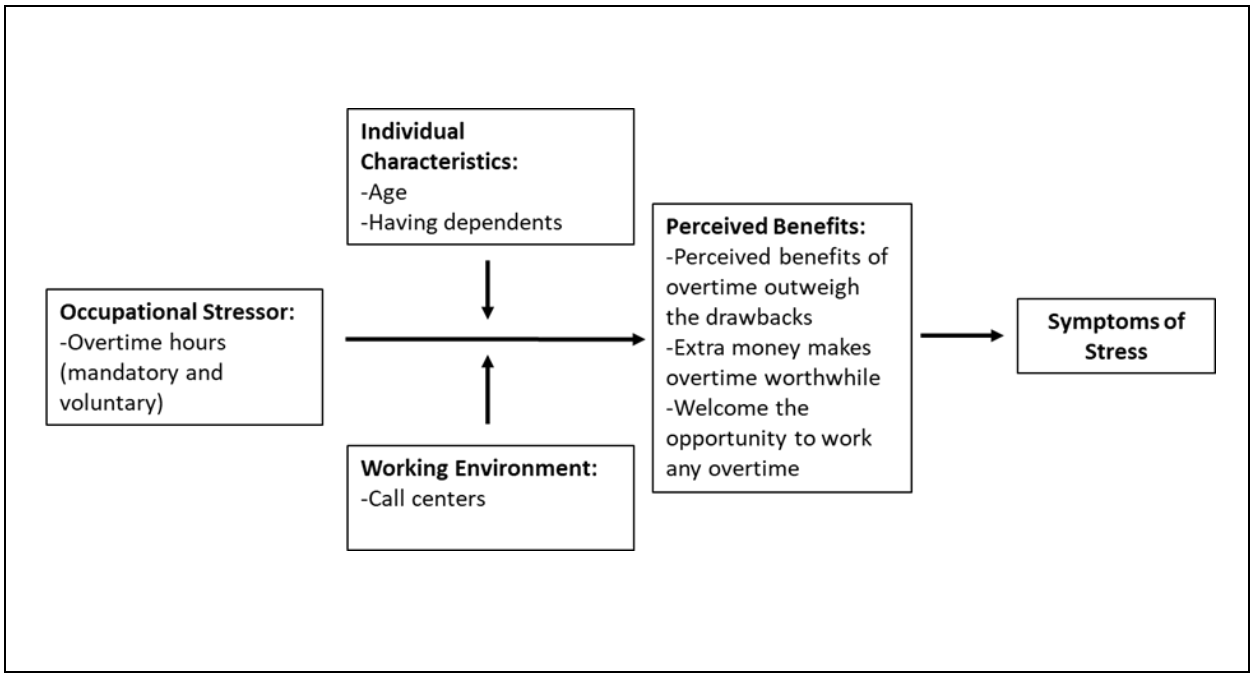

Figure 1. Conceptual Framework

Methods

Design and Data Collection

We conducted a secondary data analysis of surveys collected from a randomized controlled trial of an online mindfulness training and call center-wide stress reduction toolkit for 9-1-1- telecommunicators (Meischke et al., 2018). The primary study included baseline surveys, post surveys, and follow-up surveys as part of a larger intervention study. For this study, we used the baseline surveys from the primary study. Data were collected through an online survey between April 2013 and November 2017 from full time 9-1-1 telecommunicators at 49 call centers in the US and 2 call centers in Canada. The 9-1-1 telecommunicators were recruited through outreach campaigns, staff announcements, recruitment flyers, email, and word-or mouth. Then, they were invited to participate in the survey by email after completing an electronic informed consent form.

Measurements

Primary outcome. Stress symptoms were measured by the Calgary Symptoms of Stress Inventory (C-SOSI) (Carlson & Thomas, 2007). The C-SOSI is a reliable tool to measure physical and psychological symptoms of stress, originally developed with a group of cancer patients. The C-SOSI is a 56-item scale that is consisted of 8 subscales: Depression, Anger, Muscle Tension, Cardiopulmonary Arousal, Sympathetic Arousal, Neurological/Gastrointestinal Disorders, Cognitive Disorganization, and Upper Respiratory Symptoms. Each item was answered on 5-point Likert scales ranging from 0 (never), 1 (infrequently), 2 (sometimes), 3 (often) to 4 (very frequently) during a designated timeframe (e.g. during the last week). Cronbach's alpha reliabilities for the subscales ranged from 0.80 to 0.95. (Carlson & Thomas,

2007). The total score of C-SOSI was calculated by summing the points for each item and used for the analysis.

Overtime hours. For mandatory overtime hours, participants were asked if they have been required to work overtime in the past month with a yes or no question. And if they answer yes, they were then asked to enter the number of mandatory overtime hours. For voluntary overtime hours, participants were asked if they have volunteered to work overtime, in the past month with a yes or no question. If they answer yes, they were then asked to enter the number of voluntary overtime hours they have worked in the past month.

Perceived benefits. Participants were asked how much they agree or disagree with five statements regarding their perceptions of benefits over overtime hours with 5-points Likert scales ranging from strongly agree, agree, neither agree nor disagree or undecided, to strongly disagree. The five statements are (a) "Thinking only about mandatory overtime, the benefit outweigh the drawbacks"; (b) "I regularly volunteer for overtime specifically so I can control my schedule"; (c) "Thinking only about voluntary overtime, the benefit outweigh the drawbacks"; (d) "The extra money I earn makes working overtime worthwhile"; (e) "I welcome the opportunity to work any overtime." I assumed the 5-point Likert scale as an interval scale, coded 'Strongly agree' as 2, 'Agree' as 1…… and 'Strongly disagree' as -2, and used the scale as a continuous variable.

Call Centers. Participants were asked to provide the call center name they belonged to.

Demographic variables. Participants were asked to provide data on their gender (female/male), age category, marital status (yes/no), and having children under the age of 18 years (yes/no).

Data Analysis

Descriptive statistics were performed on overtime hours, perceived benefit, and demographic variables including its frequency, mean, and standard deviation. In addition, correlation analysis was performed to check the potential mediating effect of perceived benefits between the overtime hours and the level of stress (C-SOSI score). To test the hypothesis in this study, linear mixed-effect regression was applied to explore the association of overtime hours on the C-SOSI score while considering the 'call centers' variable as a random effect. For the random effect, we included both random intercept and random slope because data for participants nested within the organizations they belong to. All analyses were conducted using STATA statistical software (Version 14.2). Hypothesis testing was set the p-value of 0.05 as statistical significance with adjustment of multiple testing comparisons using Bonferroni correction (Noble, 2009). All analyses will set the using STATA or R statistical software.

Results

The total number of participants who participated in the baseline survey was is 441. Of these, 31.9% were aged between 26-35 and 33.3% were aged in 36-45. The majority of the participants were female (81.6%) and married (68.1%). About half of the participants reported having children under the age of 18 years (44.5%). Participants who worked for 6-10 years were 20.8% and 30.3% reported having worked for 11-20 years. Most of the participants were from the US (77.8%). The other 22.2% were from Canada. The demographic characteristics of the study participants are summarized in Table 1.

Of the 441 participants, 50.2% reported that they were required to work overtime (mandatory overtime) and among those who worked mandatory overtime, the mean mandatory overtime hours were 7.52 (SD=12.71) in the past month. The percentage of 9-1-1

telecommunicators who worked voluntary overtime was 61.06% and the mean voluntary overtime hours were 11.73 (SD=17.57). The mean of the stress symptoms scores for the participants was 59.60 (SD=32.17). Overtime hours and level of stress symptoms score are summarized in Table 2.

Table 1. Demographic Characteristics

Characteristics	Category			
Age in years (n, %)	< 26		39 (8.8 %)	
	26 - 35		141 (32.0 %)	
	36 – 45		147(33.3 %)	
	46 - 55		88 (20.0 %)	
	56 - 64		26 (5.9 %)	
Gender (n, %)	Female		359 (81.6 %)	
	Male		81 (18.4 %)	
Marriage (n, %)	Married		299 (68.1 %)	
	Not married		140 (31.9 %)	
Having children under the age of 18 years (n, %)	Yes		195 (44.5 %)	
	No		243 (55.5 %)	
Years of experiences (n, %)	< 2		56 (13.0 %)	
	2 – 5		97 (22.5 %)	
	6 - 10		90 (20.8 %)	
	11 - 20		131 (30.3 %)	
	21 - 30		45 (10.4 %)	
	> 30		113 (3.0 %)	
Country; State (n, %)	USA	343 (77.8)	California	13 (3.8)
			Florida	18 (5.3)
			Kansas	52 (15.2)
			Missouri	47 (13.7)
			North Dakota	5 (1.5)
			Oregon	62 (18.1)
			Pennsylvania	8 (2.3)
			Utah	3 (0.9)
			Virginia	1 (0.3)
			Washington	113 (32.9)
			Wisconsin	21 (6.1)
	Canada	98 (22.2)	Manitoba	98 (100.0)

About half of the participants either disagreed (28.3%) or strongly disagreed (24.1%) that the benefits of mandatory overtime outweigh the drawbacks. Whereas, more than half of the participants either agree (50.1%) or strongly agree (17.6%) that the benefits of voluntary overtime outweigh the drawbacks. In addition, the majority of the participants either agreed

(45.5%) or strongly agreed (18.5%) that the extra money they earn makes working overtime worthwhile (Figure 3).

Table 2. Overtime Hours and Stress Symptoms (C-SOSI) Score

Characteristics	Category	Participants (N=441)
Overtime hours past month		
Any mandatory overtime past month (n, %)	Yes	218 (50.23)
	No	216 (49.77)
Mandatory overtime hours last month (Mean, SD) (Min, Max)		7.52 (12.71) (0, 68)
Any voluntary overtime past month (n, %)	Yes	265 (61.06)
	No	169 (38.94)
Voluntary overtime hours last month (Mean, SD) (Min, Max)		11.73 (17.57) (0, 100)
Total C-SOSI score (Mean, SD)		59.60 (32.17) (0,203)

Correlations between overtime hours, stress symptoms and perceived benefits are presented to see if there are any relation between the perceived benefits, and the independent and dependent variable (Table 3). “Extra money worthwhile for overtime” was moderately correlated with “Welcome any overtime opportunity (r = 0.58)”, “Benefit of voluntary overtime outweighs the drawback (r= 0.50)”, and “Benefit of mandatory overtime outweighs drawbacks (r = 0.36).” There was a moderate positive correlation (r= 0.42) between “Volunteer for overtime to control schedule” and “Voluntary overtime hours.” However, there seems no statistically significant correlations between mandatory overtime hours, voluntary overtime hours, level of stress symptoms and the perceived benefits of overtime.

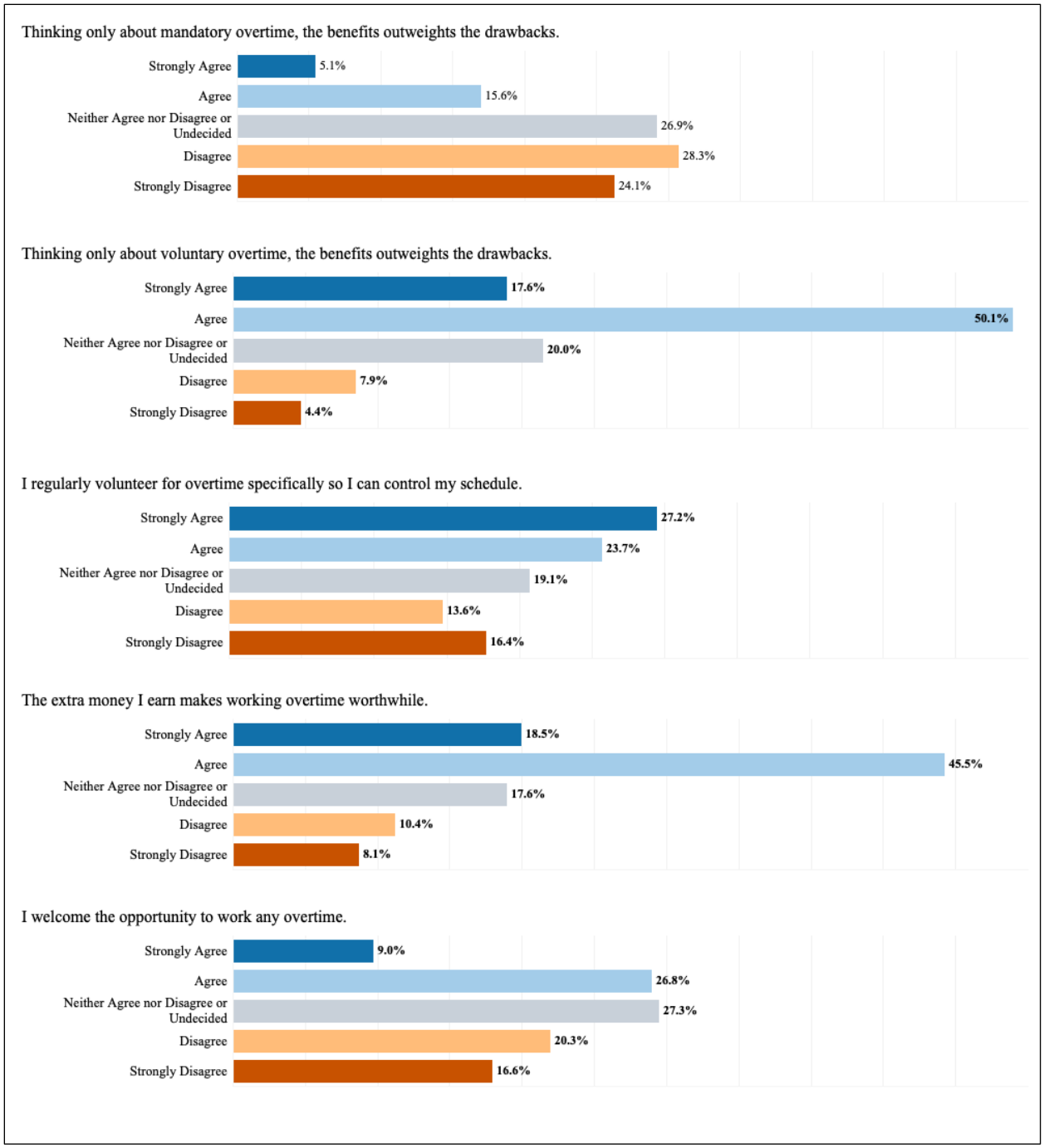

Figure 2. Percentage Distribution of Perceived Benefits

Table 3. Correlation between Perceived Benefits, Overtime, and Stress (n=441)

		Correlations						
	Variables	1	2	3	4	5	6	7
	1. Mandatory overtime hours							
	2. Voluntary overtime hours	0.07						
	3. Level of stress symptoms	0.13	-0.00					
Perceived benefits	4. Benefit of mandatory overtime outweighs drawbacks	-0.15	0.01	-0.30*				
Perceived benefits	5. Benefit of voluntary overtime outweighs the drawbacks	-0.07	0.16	-0.06	0.26			
Perceived benefits	6. Volunteer for overtime to control schedule	-0.01	0.42*	-0.08	0.17	0.40*		
Perceived benefits	7. Extra money worthwhile for overtime	-0.15	0.12	-0.29	0.36*	0.50**	0.29	
Perceived benefits	8. Welcome any overtime opportunity	-0.21	0.19	-0.23	0.45*	0.40*	0.38*	0.58**

*Correlation Coefficient (r) ≥ 0.30 and < 0.50
** Correlation Coefficient (r) ≥ 0.50

The results of the multiple linear regressions analyses are shown in Table 4 and Table 5. After adjusting for gender, marital status, having children, country, we observed significant associations between mandatory overtime hours and the level of stress symptoms among 9-1-1-telecommunicators (Table 4). Each increase overtime of 1 hour was associated with an increase in 0.41 scores of the level of stress symptoms (β = .41, p=.002). However, there was no significant association between voluntary overtimes hours and the level of stress symptoms (β = -.03, p=.783) (Table 5). For analyses by both mandatory and voluntary overtime, being female was significantly associated with an increased level of stress symptoms.

Table 4. Mixed-effect Linear Regression on Stress Symptoms by Mandatory Overtime

Variable	Coefficient	SE	*z-value*	*p-value*
Fixed effects				
(Intercept)	40.49	9.92	4.08	0.000
Mandatory overtime**	0.41	0.13	3.11	0.002
Female**	13.11	3.90	3.36	0.001
Married	-0.99	3.35	-0.30	0.768
Having children	1.69	3.11	0.54	0.588
Country: USA	4.51	9.27	0.49	0.626
Random effects				
Call Centers (Variance; SE)	135.91 (53.68)			
LR Test (Chi-Square Test; p-value)	22.87 (<0.0000)			

Note: SE=Standard Error; LR=likelihood Ratio
*p-value ≤0.05
**p-value ≤0.01

Table 5. Mixed-effect Linear Regression on Stress Symptoms by Voluntary Overtime

Variable	Coefficient	SE	*z-value*	*p-value*
Fixed effects				
(Intercept)	42.71	9.38	4.55	0.000
Voluntary overtime	-0.03	0.09	-0.27	0.783
Female*	11.58	3.93	2.94	0.03
Married	-0.31	3.36	-0.09	0.928
Having children	-0.53	3.16	-0.17	0.866
Country: USA	7.44	8.60	0.87	0.387
Random effects				
Call Centers (Variance; SE)	114.54 (53.75)			
LR Test (Chi-Square Test; p-value)	13.44 (<0.0001)			

Note: SE=Standard Error; LR=likelihood Ratio
*p-value ≤0.05
**p-value ≤0.01

Discussion

This study examined whether mandatory overtime and voluntary overtime are related to the level of stress symptoms among 9-1-1 telecommunicators. We found that mandatory overtime hours were associated with an increase in the level of stress symptoms after adjustment for demographic characteristics However, we did not find any statistically significant relationship between voluntary overtime and the level of stress symptoms.

We hypothesized that the perceived benefits of working overtime might mediate the effect of overtime on the level of stress symptoms. However, generally, there seems most smalls correlation between the perceived benefits and mandatory overtime hours, voluntary overtime hours, or level of stress symptoms. There was only one moderate positive correlation indicating participants who volunteer for overtime to control the schedules tend to report higher voluntary overtime hours. This might imply that as participants have more mandatory overtime, they tended to have higher stress symptoms regardless of the perceived benefits of working overtime.

Interestingly, we found that there is a moderate correlation between participants who agree that overtime is worthwhile due to the extra money and the ones who agree that the benefits of voluntary as well as mandatory overtime outweigh the drawback. Similar findings were reported from previous studies that one of the reasons for doing overtime is additional income (Bae et al., 2012; Lobo et al., 2018). This implies that extra money made from overtime is perceived as benefits of overtime that make it outweigh the drawbacks of overtime. However, about half the participants didn't agree that the benefits outweigh the drawbacks when it comes to mandatory overtime whereas most participants agreed that the benefits outweigh the drawbacks in terms of voluntary overtime in our descriptive analysis. Voluntary overtime was positively related to working overtime regularly in order to control one's schedule. This might

imply that despite the benefit of earning extra money, feeling not in control of scheduling mandatory overtime might be more related to the increase of stress. Future research needs to explore how call centers can better anticipate and manage overtime by making it mostly voluntary and less mandatory.

This study contributes to our understanding of the association of overtime hours, especially mandatory overtime hours, with stress among 9-1-1 telecommunicators. This study has limitations to consider. Several other variables that might be associated with the 9-1-1 telecommunicator's stress were not included because of the use of the secondary dataset. For example, workload (e.g. volume of calls received, the intensity of traumatic calls they are receiving), job satisfaction, or working environment can be an important variable that can affect stress among 9-1-1 telecommunicators. This study has limitations to be generalized to a broader population because it only included participants from 49 call centers from 11 states in the US and 2 call centers from 1 province in Canada. Considering the heterogeneity of local and federal government systems, future studies need to consider recruiting more representative samples.

Public Health Implications

Our findings have mainly two implications for overtimes hours and stress. The results of this study show that mandatory overtime hours have an impact on 9-1-1 telecommunicator's stress. Future protective approaches are needed to reducing overtime, especially mandatory overtime and managing stress symptoms among 9-1-1 telecommunicators.

The main factors that contribute to overtime for 9-1-1 telecommunicators are understaffing and low retention rates (Moore, 2019; Taylor et al., 2005). The mechanism of having understaffing, overtime, and stress was well described from previous studies (Figure 3) (Northwest Center for Public Health Practice, n.d.; Rajbhandary, 2010). More work hours can

increase stress and burn out and discourage new recruits, which leads to a shortage of staff. This, in turn, creates more overtime that worsens the shortage situation in the cycle. The trend of retention rates is going down. Between the year of 2005 and 2008, 65% of call centers had decreased employee retention while only 22% indicated that retention had increased (APCO International, 2009). Audit reports prepared by cities suggested strategies for recruiting and retaining staff. The strategies include better branding and marketing about career paths, shortening the hiring process and training periods (e.g. delays in a background check), and transforming manual scheduling to using scheduling software programs, reducing rotating shifts and providing flexible shift (Berkeley City Auditor, 2019; Doud, 2015; Taylor et al., 2005).

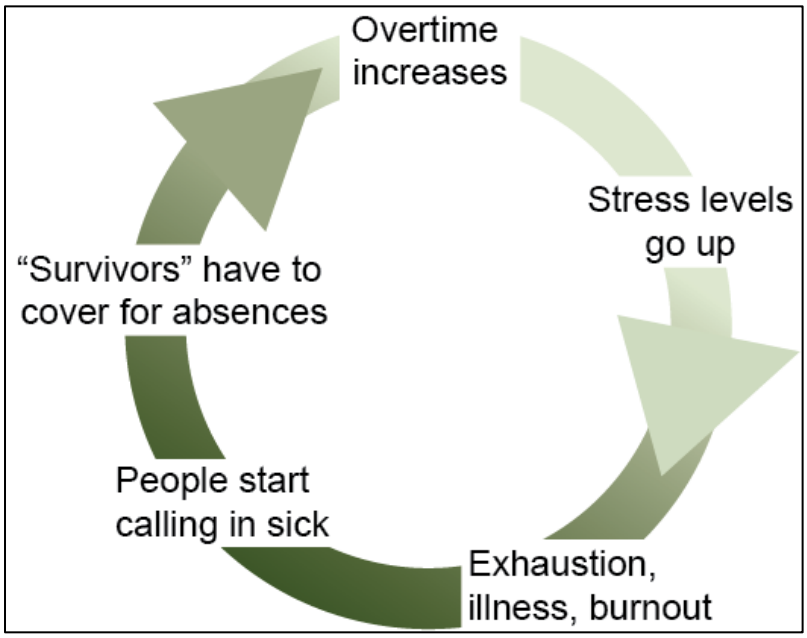

Figure 3. A vicious cycle of overtime, stress, and understaffing (Northwest Center for Public Health Practice, n.d.)

Currently, there is no regulation to limit maximum overtime for 9-1-1 telecommunicators. Regulations should include limiting maximum mandatory overtime hours per day, week, or month, rest time between shifts, discouraging rotating shifts. A study from nursing found that state overtime regulations effectively decreased mandatory overtime for newly licensed

registered nurses (Bae et al., 2012). Actions by individual, union, stakeholders or policymakers are needed to establish regulations.

Developing and implementing stress management programs specifically for 9-1-1 telecommunicators are important steps to stop the vicious cycle (The National Emergency Number Association (NENA) PSAP Operations Committee, 9-1-1 Acute/Traumatic and Chronic Stress Working Group, 2013). Future research is needed to assess stress among 9-1-1 telecommunicators and the need for stress management programs tailed to the nature of work among 9-1-1 telecommunicators.

Conclusion

Mandatory overtime hours are associated with an increased level of stress symptoms among 9-1-1 telecommunicators. Over time, both mandatory and voluntary overtime hours will be common for 9-1-1 telecommunicators as call centers' search for more solutions to understaffing. Further studies on developing interventions to reduce stress and strategies to retain and recruit staff are needed to reduce the overtime hours, especially mandatory overtime hours. In addition, continued efforts should focus on influencing policymakers to develop successful regulations that limit overtime hours for 9-1-1 telecommunicators.

References

911dispatcheredu.org. (n.d.-a). Job Duties of 911 Dispatchers. Retrieved October 15, 2019, from 911dispatcheredu.org website: https://www.911dispatcheredu.org/job-description/

911dispatcheredu.org. (n.d.-b). What is a 911 Dispatcher? Retrieved October 15, 2019, from 911dispatcheredu.org website: https://www.911dispatcheredu.org/careers/

APCO International. (2009). Project RETAINS: Next Gen Study at a Glance. Retrieved November 25, 2019, from APCO International website: https://www.apcointl.org/resources/staffing-retention/project-retains/

Bae, S.-H., Brewer, C. S., & Kovner, C. T. (2012). State mandatory overtime regulations and newly licensed nurses' mandatory and voluntary overtime and total work hours. *Nursing Outlook*, *60*(2), 60–71. https://doi.org/10.1016/j.outlook.2011.06.006

Bae, S.-H., & Fabry, D. (2014). Assessing the relationships between nurse work hours/overtime and nurse and patient outcomes: Systematic literature review. *Nursing Outlook*, *62*(2), 138–156. https://doi.org/10.1016/j.outlook.2013.10.009

Ballou, B. (2016). Mandatory overtime is excessive, Broward 911 dispatchers claim in grievance. Retrieved December 18, 2019, from Sun-sentinel.com website: https://www.sun-sentinel.com/local/broward/fl-dispatchers-file-grievance-20160824-story.html

Barker, L. M., & Nussbaum, M. A. (2011). *Fatigue, performance and the work environment: A survey of registered nurses*. 13.

Berkeley City Auditor. (2019). *911 Dispatchers: Understaffing Leads to Excessive Overtime and Low Morale*. Retrieved from Berkeley City Auditor website: https://www.cityofberkeley.info/uploadedFiles/Auditor/Level_3_-_General/Dispatch%20Workload_Fiscal%20Year%202018.pdf

Bowen, A. (n.d.). San Diego's 911 Dispatcher Shortage Is Years Old. Retrieved December 19, 2019, from KPBS Public Media website: https://www.kpbs.org/news/2016/apr/27/san-diegos-911-dispatcher-shortage-years-old/

Carlson, L. E., & Thomas, B. C. (2007). Development of the Calgary symptoms of stress inventory (c-sosi). *International Journal of Behavioral Medicine*, *14*(4), 249–256. https://doi.org/10.1007/BF03003000

Caruso, C., Hitchcock, E., Dick, R., Russo, J., & Jennifer Schmit. (2004). *Overtime and extended work shifts: Recent findings on illnesses, injuries and health behaviors.* https://doi.org/10.26616/NIOSHPUB2004143

Chait Barnett, R. (2006). Relationship of the Number and Distribution of Work Hours to Health and Quality-of-Life (QOL) Outcomes. In *Employee Health, Coping and Methodologies* (Vol. 5). Retrieved from https://doi.org/10.1016/S1479-3555(05)05003-1

Dahlgren, A. (2006). *Work stress and overtime work: Effects on cortisol, sleep, sleepiness and health: (529872013-001)* [Data set]. https://doi.org/10.1037/e529872013-001

Dembe, A. E., Erickson, J. B., Delbos, R. G., & Banks, S. M. (2005). *The impact of overtime and long work hours on occupational injuries and illnesses: New evidence from the United States*. 10.

Dong, X. S., Wang, X., & Largay, J. A. (2015). Occupational and non-occupational factors associated with work-related injuries among construction workers in the USA. *International Journal of Occupational and Environmental Health*, *21*(2), 142–150. https://doi.org/10.1179/2049396714Y.0000000107

Doud, L. (2015). *Police & fire public safety dispatcher overtime audit*. City of Long Beach Office of the City Auditor.

Dunaway, C. (2013). Stress Management for Public Safety Telecommunicators. Retrieved November 22, 2019, from Public Safety Communications website: https://psc.apcointl.org/2013/04/16/stress-management-for-public-safety-telecommunicators/

Ganster, D. C., Rosen, C. C., & Fisher, G. G. (2018). Long Working Hours and Well-being: What We Know, What We Do Not Know, and What We Need to Know. *Journal of Business and Psychology*, *33*(1), 25–39. https://doi.org/10.1007/s10869-016-9478-1

Han, K., Trinkoff, A. M., Storr, C. L., & Geiger-Brown, J. (2011). Job Stress and Work Schedules in Relation to Nurse Obesity: *JONA: The Journal of Nursing Administration*, *41*(11), 488–495. https://doi.org/10.1097/NNA.0b013e3182346fff

LeBlanc, B. (2017). Short-staffed, 911 dispatch center pays $1M in OT. Retrieved November 22, 2019, from Lansing State Journal website: https://www.lansingstatejournal.com/story/news/local/2017/10/12/911-dispatchers-rack-up-hundreds-ot-hours-amid-staffing-struggles/746287001/

Lobo, V. M., Ploeg, J., Fisher, A., Peachey, G., & Akhtar-Danesh, N. (2018). Critical Care Nurses' Reasons for Working or Not Working Overtime. *Critical Care Nurse*, *38*(6), 47–57. https://doi.org/10.4037/ccn2018616

Meischke, H., Lilly, M., Randal Beaton, Rebecca Calhoun, Ann Tu, Scott Stangenes, … Janet Baseman. (2018). Protocol: A multi-level intervention program to reduce stress in 9-1-1 telecommunicators. *BMC Public Health*, *18*(570), 10. https://doi.org/10.1186/s12889-018-5471-0

Moore, D. (2019). Answering calls for 16 hours? Staffing issues, mandatory overtime stresses county's 911 dispatch center. Retrieved November 23, 2019, from Pittsburgh Post-Gazette website: https://www.post-gazette.com/business/bop/2019/07/08/Allegheny-County-911-center-mandatory-overtime-long-hours-work-jobs/stories/201907070002

National Institute for Occupational Safety and Health. (2008). *Exposure to stress Occupational Hazards in Hospitals*. Department of Health and Human Services, CDC.

Noble, W. S. (2009). How does multiple testing correction work? *Nature Biotechnology*, *27*(12), 1135–1137. https://doi.org/10.1038/nbt1209-1135

Northwest Center for Public Health Practice. (n.d.). Overtime and stress. Retrieved December 19, 2019, from Reducing Stress: A Toolkit for 9-1-1 Call Center Managers website: http://www.nwcphp.org/docs/911-toolkit/operations/overtime.html

Pierce, H., & Lilly, M. M. (2012). Duty related trauma exposure in 911 telecommunicators: Considering the risk for posttraumatic stress. *Journal of Traumatic Stress*, 5.

Portela, L. F., Rotenberg, L., & Waissmann, W. (2005). Health, sleep and lack of time: Relations to domestic and paid work in nurses. *Revista de Saúde Pública*, *39*(5), 802–808. https://doi.org/10.1590/S0034-89102005000500016

Rajbhandary, S. (2010). Working conditions of nurses and absenteeism: Is there a relationship? An empirical analysis using National Survey of the Work and Health of Nurses. *Health Policy*, 8.

Sauter, S., Murphy, L., Colligan, M., Swanson, N., Hurrell, J., Scharf, F., … Tisdale, J. (1999). *Stress at work.* Retrieved from US Department of Health and Human Services, CDC website: https://www.cdc.gov/niosh/docs/99-101/default.html

Schuster, M., & Rhodes, S. (1985). The Impact of Overtime Work on Industrial Accident Rates. *Industrial Relations: A Journal of Economy and Society*, *24*(2), 234–246.

Stimpfel, A. W. (2015). *Scheduling and shift work characteristics associated with risk for occupational injury in newly licensed registered nurses: An observational study*. 8.

Stimpfel, A. W., Sloane, D. M., & Aiken, L. H. (2013). The Longer The Shifts For Hospital Nurses, The Higher The Levels Of Burnout And Patient Dissatisfaction. *Health Aff*, 16.

Taylor, M., Gardner, V., Clark, P., & McCombs, B. (2005). *Staffing and retention in public safety communication centers*. APCO International.

The National Emergency Number Association (NENA) PSAP Operations Committee, 9-1-1 Acute/Traumatic and Chronic Stress Working Group. (2013). *NENA Standard on 9-1-1 Acute Traumatic and Chronic Stress Management*. NENA.

Trinkoff, A. M., Le, R., Geiger-Brown, J., Lipscomb, J., & Lang, G. (2006). Longitudinal relationship of work hours, mandatory overtime, and on-call to musculoskeletal problems in nurses. *American Journal of Industrial Medicine*, 8.

Troxell, R. M. (2008). *Indirect exposure to the trauma of others: The experiences of 9-1-1 telecommunicators*.

U.S. Department of Labor. (n.d.). Questions and Answers About the Fair Labor Standards Act (FLSA). Retrieved December 19, 2019, from U.S. Department of Labor website: https://www.dol.gov/agencies/whd/flsa/faq

Wheatley, C. (2017). Nursing Overtime: Should It Be Regulated? *NURSING ECONOMIC*, *35*(4), 5.