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Research Article

Work-Related Violence in Britain: Causal Model Analysis from the Crime Survey of England and Wales

Edwards JA[1*] and Buckley P[2]

[1]*People Services, The Open University, UK*

[2]*Health and Safety Executive, Statistics Branch, Statistics and Analytics, Science Directorate, UK*

Abstract

Background: Prevalence rates of Work-Related Violence (WRV) in Britain are increasing. Urgent action is now needed to protect staff from incidents of both threats and assaults at work. **Aims:** To explore current prevalence rates on WRV and test causal predictors that influence violent incidents in an attempt to provide evidence to help develop interventions to combat workplace violence. **Methods:** Eight years of incident data from a working population is used to examine patterns of WRV from the Crime Survey of England and Wales (CSEW). **Results:** An average sample size of 1580 respondents revealed that 24% of all crime committed in Britain occurs in the workplace. Structural Equation Modelling (Multi-Group Invariance Analysis) and frequency analysis statistical approaches both show the strongest predictors of WRV are age, supervisory responsibilities and mental health. **Conclusions:** UK employers have a legal duty to protect the health and safety of workers, including WRV. The current paper contributes to the literature by using longitudinal data from a working sample of victims of crime to test the causal link between WRV, demographic variables, work characteristics and perpetrator's personality traits. The findings from this study can be used to further develop guidance on how to manage violent incidents in the workplace.

Keywords: Work-Related Violence (WRV); Crime Survey of England and Wales (CSEW); Age; Supervision; Mental health; Multi-Group Invariance Analysis (MGIA).

Introduction

Work-Related Violence (WRV) remains an under researched area within occupational health in the UK, even though the consequences can be injurious to both industry and workers [1,2]. Tombs (2006) notes offences against workers and the public arising out of work fail to be recognised within the literature. Figures show there were 694,000 incidents of WRV according to the Crime Survey of England and Wales (CSEW) in 2017/18, an increase of 8% compared to 2016/17 [3]. The majority of the increase is for assaults (up 23%), whilst threats are down 2%. Findings show that 54% of violent incident were perpetrated by strangers, whilst 46% of offenders were known to the victim. Further outcomes reported from the 2017/18 CSEW reveal that 59% of WRV incidents did not result in physical injury, though the remaining 41% of incidents did result in injury, primarily minor bruising or a black eye.

Most recently, Jones [4] noted that almost 300 WRV incidents happen every day in the UK. "Violence, threats and abuse against workers are amongst the great scourges of our society. The statistics are shocking and show that urgent action is required".

Data from a working population of victims of crime from the CSEW was used by Edwards and Buckley [5] to report prevalence rates of WRV. Across a 12 year period, findings show on average that 22% of all crimes committed occurred in the workplace. Further analysis reveals that differences in demographic (gender and age) and work characteristics (managerial/supervisory responsibilities, working hours, employment status, company size and job type) are predictors of violent incidents at work. Perpetrator's personality traits were also perceived to be related to WRV. These findings are consistent with other studies [6]. Edwards and Buckley [5] propose a theoretical model of WRV based on the outcome of results from the analysis.

More recently, Friis et al. [7] reported the damaging effects of WRV. In this study, physical violence at work predicted health-related absence from work several years after being exposed to the incident. Samuels et al. [8] highlights the concern regarding WRV specifically within the health-care sector. The paper notes the rise in workplace violent injuries for healthcare workers and the adverse consequences to employees' mental and physical health.

Methodological restrictions hinder the advancement of research within the field of WRV. For example, measurement of work violence is primarily conducted using binary scale data which restricts the scope of statistical approaches that can be used. Most data used for analysis is not designed purposely for WRV specific research, so there are sampling concerns because the data has been filtered [CSEW and 6]. Conflicting theoretical definitions which influence the measurement of WRV are also a concern. The CSEW reports both assaults and threats, the Workplace Behaviour Survey (WBS) used by Jones et al. [6] provides a broader definition of violent assaults. Research use different working samples. For instance, the CSEW collates data from a population of workers who are victims of assaults and threats, whilst the WBS collates data from a populations of workers who are

victims of negative workplace behaviours. Other contentious issues relate to studying different occupational groups, and measuring either customer or colleague violence. The above methodological and theoretical restrictions prevent comparison and repetition of results across studies.

The main aim of the current paper is to further expand the literature by exploring trends of WRV by using longitudinal data from the CSEW (2010/11-2017/18). The most recent data available shall be examined to further explore prevalence rates. Building upon the recommendations for future research from [5], Multi-Group Invariance Analysis (MGIA) techniques will test theoretical models of WRV simultaneously across data sets to test for causal patterns. The predictive influence of demographic, work characteristics and perpetrator's personality characteristics shall be tested for their predictive influence upon WRV. Further analysis examines the relationship between the above variables via a series of frequency tests in order to reaffirm statistically significant patterns in the data.

Similarly to [5], data in the current study shall be used from a sample of adult employees in Britain who have been subject to some type of violence (not just WRV), unlike other studies who simply use samples of working adults to calculate percentages of WRV [3,9].

The overall purpose is to provide a robust theoretical and methodological approach to researching WRV in an attempt to advance knowledge and understanding of the causes of violence at work. This will in turn allow evidence based interventions to be designed and implemented within UK organisations to help combat increasing rates of workplace violence.

Methods

The current data used for analysis is from the CSEW from years 2010/11-2017/18. Samples across the years are from victims of crime within the working population. Questionnaire based interviews collected data across British households in England and Wales. Data was filtered for WRV so that the following analysis can be performed. Ethical, confidentiality and data protection issues were approved by the Home Office and the Office for National Statistics (ONS).

Average sample size across the eight years of data is 1580.

Previous studies have performed Logistic Regression techniques using WRV binary/categorical data [5,6]. However, the current analysis conducts more sophisticated alternative statistical tests in order to further investigate patterns in the data.

Data from the CSEW shall be used across eight years of data 2010/11-2017/18 to test models of WRV. The following statistical approaches are used:

1. Prevalence rates of WRV (2010/11-2017/18)
2. Multi-Group Invariance Analysis (2010/11-2013/14)
3. Frequency Analysis (2014/15-2017/18)

The above multi statistical procedure provides a thorough test of historic WRV prevalence rates and causal/predictive patterns within the CSEW data. Data is split for the MGIA and the Frequency Analysis in order to provide a broad year on year range of data sample analysis.

The Statistical Package for the Social Sciences (SPSS) software was used for the statistical techniques 1 and 3 above, and Analysis of Moment Structures (AMOS) was used for technique 2. Ethical concerns associated with the study were approved by the Home Office.

Results

Prevalence of WRV from the CSEW on average across an eight year period from 2010/11 - 2017/18 is 24% (see Figure 1). This figure is generated from a population of working people who have been victims of crime, and is a slight increase compared to the prevalence rates reported by [4] across years 2001/02 - 2012/13 which was 22%. The most recent figure for 2017/18 was 25%, an increase on 2016/17 of 1%. WRV is calculated as an overall average of both assaults and threats.

Figure 1 shows the flow of WRV rates across eight years, which reflects a percentage of all violent crime reported in England and Wales. Prevalence rates of WRV have steadily increased since 2010/11 through to 2015/16, then came down in 2016/17, and increased again in 2017/18.

According to the CSEW data in 2017/18 (HSE 2019), 2% of all working adults report incidents of WRV, whereas working adult victims of all crime report 25% (present study).

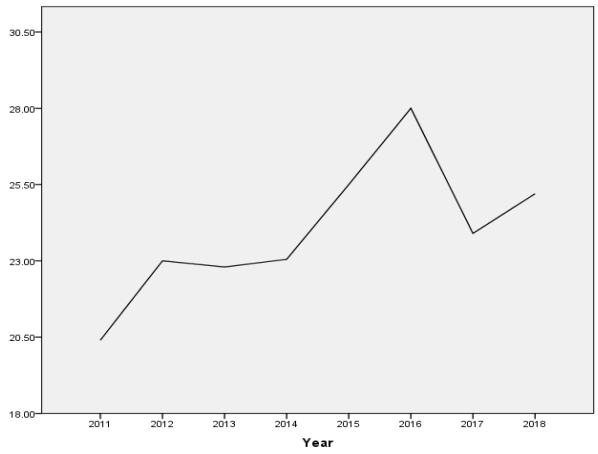

Figure 1: Work-Related Violence in England and Wales from 2010/11 - 2017/18.

To test the equivalence of the CSEW WRV causal structure across four separate successive years of data, a Structural Equation Modelling (SEM) invariance analysis procedure was conducted. This technique explores if the proposed regression model operates equivalently across different groups. Simultaneous analysis of several groups of data allows cross-validation of the accuracy of the current WRV model. This powerful statistical approach is supported by a number leading authors in the field of invariance analysis [10-12].

A prerequisite for SEM MGIA is to firstly run the proposed model individually across different groups of data. Results show that the WRV causal model is good fitting

across all four CSEW datasets (Table 1). The most recent 2013/14 group of data used for this series of analysis produced the following results: $\chi^2 = 174.14$, df = 19, P <0.001, GFI = 0.98, CFI = .89 and RMSEA = 0.05.

CSEW Datasets	χ^2	DF	GFI	CFI	RMSEA
2010/11	75.38	19	0.98	0.91	0.04
2011/12	100.28	19	0.98	0.89	0.05
2012/13	94.24	19	0.99	0.92	0.05
2013/14	174.14	19	0.98	0.89	0.05

Table 1: Goodness-of-fit statistics for Work-Related Violence causal model.

Figure 2 shows the regression weights from the demographic, work characteristics and perpetrator's personality characteristics predictor variables upon WRV for 2013/14. The strongest statistically significant predictors of violence at work are age, occupation, supervision and mental health.

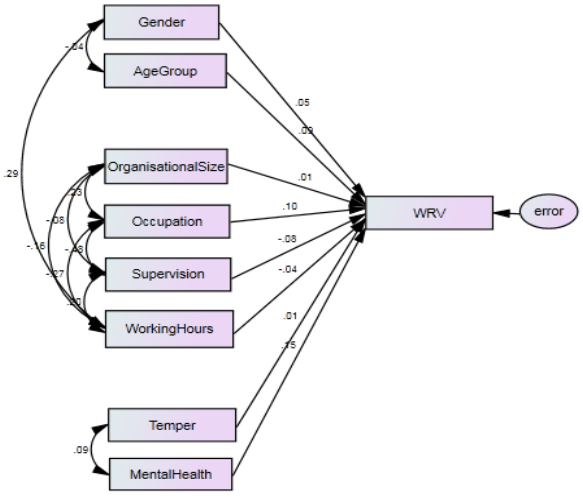

Figure 2: Causal model of Work-Related Violence in England and Wales.

Multi-Group Invariance Analysis is now conducted. Model 1 with no parameter constraints is tested first to act as a baseline model to investigate more restrictive models of invariance. Parameters are constrained to be equal across groups in MGIA in order to be considered invariant [13]. Thus, Model 2 constrains the eight independent variable regression weights across all four CSEW datasets, and Model 3 tests for error covariances.

The chi-square difference test ($\Delta\chi^2$) is calculated to assess if there is a significant difference between different constrained models. Where there is a significant difference between any two models, this reveals that some equality constraints are not consistent across the four CSEW data sets. Where there is a non-significant difference, this indicates that the WRV model is invariant across groups. Use of the CFI difference test (ΔCFI) is also used as an alternative to determine multi-group model invariance differences. The ΔCFI is less sensitive to sample size, and has been recommended by leading authors in the field [10,14]. A ΔCFI value higher than 0.01 is indicative of a significant reduction in fit.

Model 1 with free parameter constraints produced a good fit across the four CSEW data sets: $\chi^2 = 444.14$, df = 76, P <0.001, GFI = 0.98, CFI = 0.90 and RMSEA = 0.03. Model 2 with regression weight constraints did not produce a significant $\Delta\chi^2$ or reduction in fit (ΔCFI) compared to Model 1. This reveals that equality constraints hold for the WRV model through the four data sets. Increasingly more restrictive Model 3, now with additional constrained error covariances, also shows the model to be invariant, with no significant $\Delta\chi^2$ or reduction in fit (ΔCFI). In summary, the results show that all regression weights and error covariances in the current study's WRV causal model are operating equivalently across all four CSEW samples from 2010/11-2013/14.

Further analysis to support the above results shall now be performed using the most recently available WRV data from the CSEW.

Cross tabulation of data shall be examined across four years of data 2014/15 - 2017/18 to explore the association between WRV and the eight variables shown in Figure 1. The Chi-square statistic will be used to detect significant differences in frequency data. Table 2 shows the results from the most recent 2017/18 CSEW data.

	WRV	Non-WRV	χ^2
Gender			
Male	180 (13%)	480 (35%)	2.97
Female	163 (12%)	539 (40%)	
Age Group			
20-24	15 (1%)	100 (8%)	36.40**
25-34	76 (6%)	202 (16%)	
35-44	76 (6%)	181 (14%)	
45-54	106 (8%)	186 (15%)	
55-64	54 (4%)	158 (13%)	
65-74	14 (1%)	95 (8%)	
Organisational Size			
1-24	104 (9%)	288 (26%)	0.51
25-499	150 (13%)	374 (34%)	
500 or more	55 (5%)	147 (13%)	
Occupation			
Semi-Routine and Routine	75 (7%)	229 (20%)	6.71
Low Supervisory	21 (2%)	82 (7%)	
Intermediate Occupations	39 (3%)	111 (10%)	
Managerial	176 (16%)	400 (35%)	
Supervision			
Yes	152 (14%)	315 (28%)	9.87**
No	158 (14%)	499 (44%)	
Working Hours			
Full-Time	286 (22%)	697 (54%)	15.95**
Part-Time	56 (4%)	260 (20%)	
Temper			
Yes	143 (11%)	320 (24%)	12.10**
No	200 (15%)	699 (51%)	
Mental Health			
Yes	63 (5%)	53 (4%)	57.09**
No	280 (21%)	966 (71%)	

**p < 0.001

Table 2: Frequency of Work-Related Violence by demographic, work characteristics and perpetrator's personality characteristics (2017/18).

Results show there was no significant difference between males and females and frequency of WRV ($\chi^2 = 2.97$, df = 1, NS), although there was for age, with 45-54 year olds reporting the highest percentage of WRV ($\chi^2 = 36.40$, df = 5, P <0.001). The above findings for demographic data holds consistent for years 2014/15, 2015/16 and 2016/17.

Findings from the analysis of work characteristics variables shows that organisational size did not have a statistically significant effect upon WRV ($\chi^2 = 0.51$, df = 2, NS), although organisations that employ between 25 and 499 workers had the highest percentage of incidents of violence at work compared to other size categories. This result is consistent across previous years (2014/15 - 2016/17). Occupation also produced a non-significant result, although figures are approaching significance, with managers reporting the greatest number of incidents of WRV ($\chi^2 = 6.71$, df = 3, NS). However, data from the three previous years reported a significant difference across occupational groups, with managerial positions exhibiting the greatest number of reported incidents of WRV.

Employees with supervisory responsibilities produced a significant difference in rates of WRV compared to staff that have no supervisory duties ($\chi^2 = 9.87$, df = 1, P <0.001), which is consistent with previous years CSEW data in the current study. Full-time employees reported significantly higher levels of WRV compared to part-time workers ($\chi^2 = 15.95$, df = 1, P <0.001), again consistent with the previous three years of data.

Perpetrator's personality characteristics produced significant results. Respondents reported that both the perpetrator's temper/intolerant attitude and mental health problems were factors as to why violent incidents occurred. In other words, the perpetrator's perceived temper ($\chi^2 = 12.10$, df = 1, P <0.001) and mental health state ($\chi^2 = 57.09$, df = 1, P <0.001) are factors in determining whether a WRV incident happens or not.

Discussion

Principal findings from the present study reveal that nearly a quarter of all British crimes on average (from a working population) across an eight year period are committed in the workplace (24%). Simultaneous analysis across four sets of CSEW data using MGIA techniques show that the WRV causal model in Figure 2 significantly fits the data. Frequency analysis using data from 2014/15 - 2017/18 show that age, supervisory duties, working hours and the perpetrator's temper and mental health are all factors as to why a violent incident happens in the workplace. Overall, across the MGIA and frequency analysis, age (demographic), supervisor responsibilities (work characteristics) and mental health (perpetrator's characteristics) produced the strongest set of results in defining attributes that predict WRV.

Are the current results consistent with previous research? Prevalence rates of WRV are fairly consistent with the most recent figures from the CSEW as well as over periods of time, only slightly higher at 1% and 2% respectively. Although levels of WRV across a sample of the working population is similar to the last few years [3], rates of WRV as a percentage of overall crime from a working population has increased.

Evidence from the current analysis show that difference in age is a significant factor in predicting WRV. This finding is consistent with previous research [5,6]. Demographic variable gender was not a predictive factor in determining violence in the workplace within the present study. However, [5] and [6] found that gender was a significant factor in predicting customer perpetrated violence.

Based on the results from both the current study's MGIA and frequency analysis, employees with supervisory duties were more likely to be victims of WRV than staff that had no supervisory responsibilities. Compared to other research in the literature, this finding is consistent [5]. Findings from the MGIA revealed that differences in respondents' occupational group predicts WRV, which is consistent with previous research outcomes [5,6], although this was not the case for the present study's frequency analysis. Similarly to the literature [5,6], the current results found that working hours (full-time) was significantly linked to WRV. However, this finding was not consistent with the results from the frequency analysis. Organisational size was not related to WRV within the current study for either the MGIA or the frequency analysis. This findings is inconsistent with previous research, where [5] and [6] both found that the number of workers within an organisation has a significant association with violent incidents at work.

Perpetrator's personality characteristics (mental health and temper) were revealed as significant indictors of WRV. Both the MGI and frequency analysis showed that respondents' perceived interpretation of the offender's mental state was a contributing factor as to why a violent incident occurred at work. Frequency analysis from the current study, but not the MGIA, showed that the temper of the perpetrator was also a factor in predicting WRV. These two variables have only been reported once in the literature by [5], where the findings are consistent with the present analysis.

Employers in the UK have a legal responsibility to safeguard the health and safety of workers, which includes protection from WRV [15]. It is therefore important that appropriate interventions are introduced within organisations to prevent violent incidents occurring. A standardised approach to monitoring, diagnosing and preventing WRV will help employers to tackle the potential adverse effects of violent incidents at both employee and organisational level. The current paper aims to provide evidence to locate employees with particular characteristics that are particularly vulnerable to WRV, so that appropriate measures can be introduced to design methods of intervention to protect staff. Edwards et al. [5] found from their research that workers with supervisory/managerial duties (work characteristics) were particularly vulnerable to exposure to violence at work. The current study goes on to further support this finding, along with raising awareness predominantly about differences in employees' age and the perpetrator's mental health.

As outlined in the Introduction, a number of methodological problems have restricted the current research and provided limitations. In particular, inconsistencies within the research field of WRV regarding measurement, data samples and definitions of violence have all contributed to contradictory output of results. Hence, future research needs

to establish a standardised method of defining, measuring, analysing and reporting WRV data.

Overall, the current study's results show that WRV is on the increase, with particular demographic, work characteristics and perpetrator's personality characteristics all culminating as factors as to why a violent incident occurs.

Conclusion

- Violence in the workplace is on the increase, which has a damaging affect to both employers and employees.
- Based on a sample of victims of crime from an adult working population, 24% of all violent crimes in Britain occur in the workplace.
- The impact of workplace violence has implications for employees (job dissatisfaction, physical injury, psychological injury, absence and stress), employers (compensation claims, damaged reputation, legal enforcement, recruitment costs, sick pay and turnover), policymakers and society in general.

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***Corresponding author:** Dr Julian A. Edwards., People Services, The Open University, Wilson Building, Walton Hall, Milton Keynes, MK7 6AL, UK; Tel: 01908 858910, e-mail: julian.edwards@open.ac.uk

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