









Fig.2 Collaboration chart of authors with a high number of WPV publications

### 3.3 WPV Domain Knowledge Base

Literature list information was obtained through the "Generate a narrative" operation in Cite Space, and centrality, burstiness, and citation frequency were used to derive important literature information. In bibliometrics, cited literature is usually used as the knowledge base.

#### 2.3.1 Co-cited literature mapping in WPV domains

In this study, the cited literature is used as the node, and the citations of the selected literature are analysed through Cite Space to generate the WPV co-cited literature map (Fig. 3).

Fig.3 Co-citation mapping in the field of WPV

### 3.3.2 Highly co-cited literature in the WPV domain

Based on the frequency of co-citation, the top 6 co-cited documents were selected and plotted in a table (Table 1). The research methods of the current situation analysis of WPV, the measures against workplace violence, the cost analysis after workplace violence, the impact on the quality of work life, and turnover intention are mainly review and cross-sectional analysis

Table 1 List of Top 6 Highly Cited Literature in the field of WPV

Count	Year	Cited References
102	2019	Liu JX, 2019, OCCUP ENVIRON MED, V76, P927, DOI 10.1136/oemed-2019-105849
94	2014	Spector PE, 2014, INT J NURS STUD, V51, P72, DOI 10.1016/j.ijnurstu.2013.01.010
93	2016	Phillips JP, 2016, NEW ENGL J MED, V374, P1661, DOI 10.1056/NEJMra1501998
54	2014	Speroni KG, 2014, J EMERG NURS, V40, P218, DOI 10.1016/j.jen.2013.05.014
50	2017	Choi SH, 2017, J NURS MANAGE, V25, P508, DOI 10.1111/jonm.12488
50	2018	Yang BX, 2018, ARCH PSYCHIAT NURS, V32, P31, DOI 10.1016/j.apnu.2017.09.013

### 3.4 The analysis of high-frequency keywords in the field of WPV

Keywords represent a high degree of summary and condensation of the topic of a piece of literature.

#### 3.4.1 List of the top 20 high-frequency co-occurring words in the field of emergency WPV

The keyword co-occurrence knowledge graph is generated by CiteSpace, in which nodes represent keywords, the size of nodes reflects the frequency of keywords, and the thickness of the connecting lines between nodes reflects the degree of connection between nodes (Mario Coccia & Secondo Rolfo, 2002). A total of 467 co-occurring keywords were obtained, and 86 keyword nodes with a co-occurrence frequency of greater than or equal to 20 were included in the graph, as illustrated in Figure 4. The top 20 keywords were analysed in terms of their frequency of occurrence and centrality, as illustrated in Table 2. Table 2 shows that the top five keywords in terms of centrality are "workplace violence", "nurses", "workplace", "aggression" and "impact".

Table 2 List of high-frequency co-occurring words

Frequency	Centrality	Year	Keyword
1094	0.18	2015	workplace violence
828	0.15	2013	nurses
293	0.14	2014	workplace
262	0.12	2013	aggression
202	0.11	2015	impact
197	0.11	2015	prevalence
157	0.11	2019	stress
153	0.1	2018	experiences
150	0.1	2013	health
148	0.1	2013	risk factors



Fig.4 Keyword co-occurrence mapping

### 3.4.2 Specific analyses of research themes in the WPV research area

3.4.2.1 The study found that female nurses are the main targets of workplace violence, with the majority of incidents occurring in the emergency department and involving violent conflicts with patients.

3.4.2.2 The study also identified the harms caused by workplace violence. The keywords "stress", "mental health", "health", "burnout" and "job satisfaction" indicate that nurses who experience workplace violence not only suffer physical trauma but also develop psychological problems, which ultimately result in them leaving their jobs. This, in turn, hurts the stability of the nursing workforce.

3.4.2.3 Interventions following the experience of workplace violence: The keywords "management", "education", "prevention" and other related terms indicate that the relevant departments have gradually begun to address the issue of workplace violence

through training. This represents a progressive shift in the management of workplace violence.

### 3.5 Research Trends in WPV

#### 3.5.1 Mapping the WPV domain of emergent words

The "Burst Detection" operation in CiteSpace was employed to identify keywords that emerged in a short period (Fig. 5). Emerging words are regarded as indicators of research frontiers, which emerge due to the emergence of new research trends and sudden changes in the direction of research over some time. Two key aspects of emergent terms can be identified: the intensity of emergence, which represents the intensity of the keyword emergence, and the duration, which includes the beginning and end of the keyword emergence time.

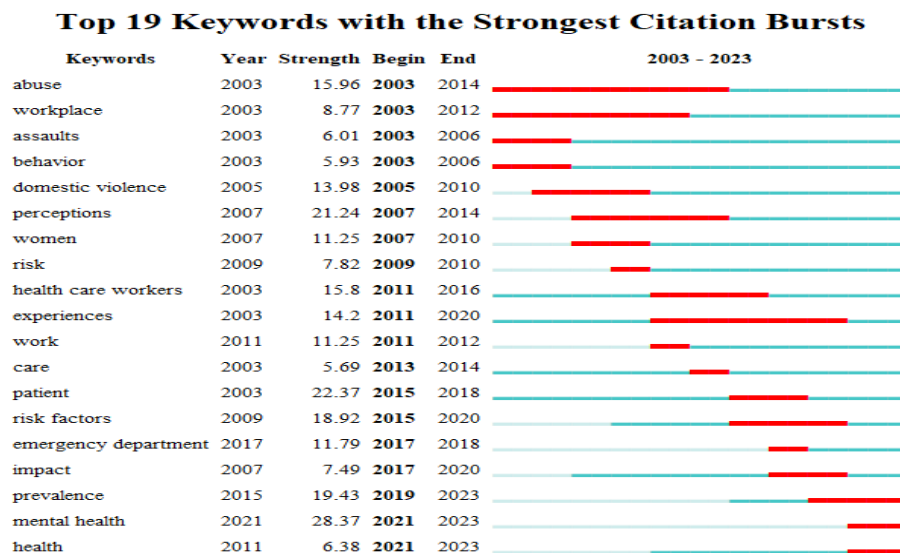


Fig. 5 Keywords with the Strongest Citation Bursts

#### 3.5.2. Specific trend analyses

A total of 19 keywords were identified as exhibiting the strongest mutation strengths. When combined with the chronological development order, these 19 keywords revealed the following research trends:

2003-2014, the relevant research is more concentrated, and the duration of the emergent word is longer. The term "workplace" is used in this context to refer to the environment in which employees work. The term "abuse" is used to describe any form of mistreatment or mistreatment of power. The term "behaviour" is used to describe the way in which individuals act or behave. The term "risk" is used to describe the probability of an adverse outcome. The term "women" is used to describe female employees. The high intensity of mutation indicates that this period of time was

dominated by the current investigation of the types of violence in the workplace and the proportion of violence occurring. The types of violence were mainly verbal violence.

2015-2020, The strongest mutation for "experience" suggests that the study is beginning to focus on nurses' experiences of workplace violence, with experiential interviews to understand the physical and psychological changes that occur when nurses are exposed to workplace violence. Furthermore, the term "risk factor" signifies that research on the primary factors that contribute to the incidence of violence in the workplace can effectively reduce the incidence of violence in the workplace by initiating prevention and control measures for these factors.

2021-2023, The emergent words "health" and "mental health" indicate that such events may have an impact on the health of staff, suggesting that the study was concerned with the health of nurses.

A comprehensive analysis of the retrieved relevant literature shows that the direction of WPV research is broadly divided into status quo research, influencing factors research and solution measures research. In different periods, with the development of WPV research and related studies in management and psychology, the entry points of research will be different, but this difference is not absolute.

## 4.0 DISCUSSION

### 4.1 Analysis of the number of publications authors and countries

The results of this study indicate that research on workplace violence in nursing has demonstrated an increasing trend year on year. The majority of foreign researchers originate from the United States and several developed countries in Europe. The links between high-frequency keywords in the field of WPV are relatively fragmented, with a considerable number of research directions, a relatively small number of cross-studies, and a diverse range of research contents. Workplace violence is a pervasive issue in the healthcare sector, exerting a profound impact on the physical and mental well-being of nurses. To address this challenge, organizations must enhance collaboration to effectively tackle the issue of workplace violence in nursing. In terms of research on workplace violence, there is a preponderance of cross-sectional studies, with a relatively limited number of intervention studies.

### 4.2 Analysis of research hotspots and trend

4.2.1 Mental health Mental health is both a high-frequency keyword and a mutation that continues to this day. Nurses are exposed to a variety of occupational health risks, among which workplace violence is a major challenge related to the work of medical workers, and workplace violence has a great impact on the physical and mental health of medical workers. A study by M Cannavo et al., on predictors of workplace-related violence leading to healthcare-related illness, showed that 87% of emergency department healthcare workers experienced workplace violence by patients or their relatives(M. Cannavò, F. La Torre, C. Sestili, G. La Torre, & M. Fioravanti, 2019).



There is a wide range of ways in which WPV may affect employees' mental and physical health, as well as their relationships with coworkers and their level of productivity (M. Cannavò et al., 2019). It is possible that carer burnout, injuries, or stress brought on by dealing with aggressive patients might lead to an increase in the frequency of medical errors and a decline in patient outcomes (Y. C. Chang, M. C. Hsu, & W. C. Ouyang, 2022; P. Gray et al., 2019; W. Liu et al., 2018). The high turnover rate (27%) among new nurses during their first three years on the job has been connected to direct bullying practices, which account for one-third of the departures and most often come from nurse supervisors or staff nurses (H. E. Chang & S. H. Cho, 2023). These ramifications have the potential to imperil the capacity of health service providers to retain workers and to establish the type of cohesive nursing unit atmosphere that is required to serve patients with high-quality care (B. Kaddourah, A. K. Abu-Shaheen, & M. Al-Tannir, 2018). Additional effects of workplace violence include burnout, turnover intention, and job satisfaction, according to research published by Wenhui Liu, Shihong Zhao, and Other research team members (W. Liu et al., 2018). Some individuals go to work even when they are fighting off an illness or have a fever. It can be seen that the incidence of workplace violence suffered by nursing staff is high and harmful. Workplace violence not only harms the physical health of medical staff but also causes a series of psychological problems. Therefore, after suffering from workplace violence, how to improve the healthy psychological state of nurses and promote the health of the critical care workforce is an urgent and long-lasting problem researchers need to address.

#### 4.2.2 Influencing factors of workplace violence

The term "risk factors" is also a high-frequency term used in the field of workplace violence. The current research focus is on the analysis of the factors associated with WPV among nurses and the development of targeted interventions to reduce the incidence of WPV. To date, several studies have indicated that the factors influencing workplace violence are primarily related to individuals, environments, and organizations. Regarding the individual factors, those related to nurses are predominantly gender, age, and work experience. Conversely, the factors related to environments and organizations are mainly the high pressure of nursing work, irrational scheduling, and insufficient personnel (K. L. Edward, K. Ousey, P. Warelow, & S. Lui, 2014). A cross-sectional survey of workplace violence in primary hospitals in southeastern China identified gender, age, marital status, education level, technical position, and number of beds as independent risk factors for workplace violence (H. Zhu et al., 2022). A study conducted at a government hospital in Malaysia found that the prevalence of workplace violence (WPV) was higher among nurses in the  $\leq 30$  age group than among nurses in higher age groups (I. Halim et al., 2022). However, the current investigations of influencing factors are mainly cross-sectional, therefore, in future cross-sectional studies in this field, on the one hand, the sample size should be enlarged and the sampling method should be improved to reduce bias; on the other

hand, the research methodology could be a mixed study combining quantitative and qualitative research, with a focus on understanding the influence of nurses' professional qualities, hospital environmental factors, and patients' factors on the prevalence of WPV.

### 5.0 CONCLUSION

In summary, workplace violence is an ongoing topic of clinical concern, with a high volume of publications but poor collaboration between authors and institutions, so it is recommended that healthcare organizations and medical schools strengthen their collaboration. From the research trend, the study of the mental health of nurses after suffering from workplace violence will be an ongoing hot research. At the same time, the way of intervention of WPV for victims, mainly nurses, should also be the focus of research in recent years. As a bibliometric study of WPV, the literature involved is from the Web of Science, which may not fully cover the field of WPV.

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### Credit Authorship Contribution Statement

**Jing Sun:** Conceptualization, Methodology, Validation, Formal analysis, Investigation, Data curation, Writing - original draft, Writing - review & editing, Project administration. **Faridah Mohd Said :** Conceptualization, Formal analysis, Writing – review & editing, Resources, Supervision. **Tan Beng Geok:** Conceptualization, Methodology, Validation, Formal analysis, Supervision.

### Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

### REFERENCES

- Boyle, Malcolm J., & Wallis, Jaime. (2016). Working towards a definition for workplace violence actions in the health sector. *Safety in Health*, 2(1), 4. doi:10.1186/s40886-016-0015-8
- Cannavò, M., La Torre, F., Sestili, C., La Torre, G., & Fioravanti, M. (2019). Work Related Violence As A Predictor Of Stress And Correlated Disorders In Emergency Department Healthcare Professionals. *Clin Ter*, 170(2), e110-e123. doi:10.7417/ct.2019.2120
- Chang, H. E., & Cho, S. H. (2023). Turnover intention and retention of newly licensed nurses in their first job: A longitudinal study. *Int Nurs Rev*, 70(3), 338-344. doi:10.1111/inr.12799
- Chang, Y. C., Hsu, M. C., & Ouyang, W. C. (2022). Effects of Integrated Workplace Violence Management Intervention on Occupational Coping Self-Efficacy,

- Goal Commitment, Attitudes, and Confidence in Emergency Department Nurses: A Cluster-Randomized Controlled Trial. *Int J Environ Res Public Health*, 19(5). doi:10.3390/ijerph19052835
- Coccia, Mario, & Rolfo, Secondo. (2002). Technology transfer analysis in the Italian National Research Council. *Technovation*, 22, 291-299. doi:10.1016/S0166-4972(01)00018-9
- Edward, K. L., Ousey, K., Warelow, P., & Lui, S. (2014). Nursing and aggression in the workplace: a systematic review. *Br J Nurs*, 23(12), 653-654, 656-659. doi:10.12968/bjon.2014.23.12.653
- Gray, P., Senabe, S., Naicker, N., Kgalamono, S., Yassi, A., & Spiegel, J. M. (2019). Workplace-Based Organizational Interventions Promoting Mental Health and Happiness among Healthcare Workers: A Realist Review. *Int J Environ Res Public Health*, 16(22). doi:10.3390/ijerph16224396
- Halim, I., Syukur, A. Z., David, C. C. H., Hanis, A., Baharudin, M. H., & Dzualkamal, D. (2022). Workplace violence among nurses in a Penang hospital: Prevalence and risk factors. *Med J Malaysia*, 77(6), 744-749.
- Kaddourah, B., Abu-Shaheen, A. K., & Al-Tannir, M. (2018). Quality of nursing work life and turnover intention among nurses of tertiary care hospitals in Riyadh: a cross-sectional survey. *BMC Nurs*, 17, 43. doi:10.1186/s12912-018-0312-0
- Lim, M. C., Jeffree, M. S., Saupin, S. S., Giloi, N., & Lukman, K. A. (2022). Workplace violence in healthcare settings: The risk factors, implications and collaborative preventive measures. *Ann Med Surg (Lond)*, 78, 103727. doi:10.1016/j.amsu.2022.103727
- Liu, W., Zhao, S., Shi, L., Zhang, Z., Liu, X., Li, L., . . . Ni, X. (2018). Workplace violence, job satisfaction, burnout, perceived organisational support and their effects on turnover intention among Chinese nurses in tertiary hospitals: a cross-sectional study. *BMJ Open*, 8(6), e019525. doi:10.1136/bmjopen-2017-019525
- NSI Nursing Solutions, Inc. (2019). 2019 National health care retention and RN staffing report. Retrieved from [www.nsinursingsolutions.com](http://www.nsinursingsolutions.com)
- Zhu, H., Liu, X., Yao, L., Zhou, L., Qin, J., Zhu, C., . . . Pan, H. (2022). Workplace violence in primary hospitals and associated risk factors: A cross-sectional study. *Nurs Open*, 9(1), 513-518. doi:10.1002/nop2.1090