

The Research Review and Hot Topics Analysis of Work Disruption from an Organizational Perspective

-A Visual Analysis Based on Knowledge Graphs

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ABSTRACT

With the advent of the epidemic era and the massive use of information technology in the work environment, task interruptions have become more frequent and unavoidable, which has a significant impact on the work of employees in organizations. By collecting and organizing the literature of work interruption-related studies in the past 20 years and relying on the scientometrics analysis software Citespace for visual analysis, the current status of work interruption research is carefully depicted from different dimensions with respect to authors, issuing institutions, keyword co-occurrence, prominence, time zones, and clustering. With the help of the above analysis, summary and combing, it is found that work disruption has changed from an early focus on a single medical disruption to a cross-complementary situation with multi-disciplinary knowledge (e.g., engineering, IT, etc.), the research methodology has changed from theoretical case interpretation to a qualitative and quantitative analysis based on theory, and the disciplinary backgrounds of research scholars have become diversified.

Keywords: *Work interruption, Research hotspot, Citespace, Knowledge graphs.*

1. INTRODUCTION

The workplace has changed dramatically in the last 20 years, with an emphasis on collaboration and open offices making work interruptions common (Mark, 2015). Colleagues drop in for help, updates or unexpected social events, and supervisors check on work or assign new tasks (Mark, Gonzalez, & Harris, 2005). As technology spreads and evolves, the proportion of work done online increases each year, and the outbreak of the new crown epidemic in early 2020 has significantly boosted the use of instant contact in the office, with the unpredictability of instant messages such as WeChat and the sheer volume of emails, documents and phone calls making it even more overwhelming. As a result work interruptions can be rife at the moment.

Although a large body of research on job disruption has emerged in this 20-year period due to a dramatic change in the environment, this research is scattered across disciplines, for example, medical disruption (Biron, Loisel, & Lavoie-Tremblay, 2009; Raban & Westbrook, 2014), IT or IT disruptions (McFarlane & Latorella, 2002; Rissler, Nadj, Adam, & Maedche, 2017)

or focus primarily on defining and classifying work disruptions (Sasangohar, Donmez, Trbovich, & Easty, 2012) and are rarely integrated.

With this in mind, this paper analyses the current state of work interruption research at home and abroad with the help of a literature review, with a view to providing references for relevant research and practice, and promoting the improvement of organisational productivity.

2. DATA AND METHODS

2.1. Thesis data collection

The foreign literature data for this study were selected from the Web of Science core collection (article or review type), Google Scholar and other databases. We used the terms "interruption", "intrusion", "distraction" and the descriptive terms "work", "task" and "workplace", limited to the period 2000-2022, and searched on 11 February 2022. A total of 4641 English-language documents were searched. The literature was then filtered

and analysed according to "title + abstract + keywords", resulting in 4152 documents.

2.2. Citespace tools

Citespace is software that visualises and analyses the results of searches of literature to obtain a scientific knowledge map that presents the structure, patterns and development of research within a field. The three main ways of visualising data are cluster views, timeline charts and time zone charts. The cluster view focuses on the structural features between categories and highlights key nodes; the time zone diagram focuses on the evolution of knowledge in the time dimension; and the timeline diagram focuses on the relationships between clusters and the historical span of the literature in the clusters. In this paper, the retrieved data from 2002-2022 is imported into Citespace (version 5.8.R3), and the relevant parameters are tuned to create cluster views and timeline diagrams, which are used to distil the hotspots and trends of research interruptions, and to select representative literature from each cluster for refinement and analysis to gain insight into the specificity and quality of research.

3. CITESPACE-BASED WORK INTERRUPTION LITERATURE OVERVIEW ANALYSIS

In terms of the temporal distribution of literature numbers (Figure 1), the number of work interruption research literature showed a steady increase from 2002 to 2021. before 2008 the overall research trend was less active and grew at a slow rate, after 2008, as time evolved, the constant pursuit of collaborative and open work and the continuous development of information dissemination technologies, the literature related to work interruption maintained a steady increase with a certain slope of the x-axis/ The rate of growth with a certain slope of the time axis continued to grow until after 2019, when the rate of growth increased year by year, especially with the epidemic at the end of 20, which increased the sense of urgency for the development of collaborative work online and the consequent focus of researchers on work task interruptions. Overall, the advancement of information technology has elevated the focus on workplace task interruptions, thereby contributing to research development.

In terms of representative journals and institutions, the published research literature is spread across 2525 journals in areas such as psychology, engineering, computing, and medicine. The journal Engineering

electrical electronic has the highest number of published journals, with 48 articles. The author institutions were most concentrated in the University of California System, while the remaining authors were more dispersed, including university academics and related practitioners. Overall, the work interruption research area has more interdisciplinary crossover and complex and diverse characteristics.

The Citespace timeline diagram focuses on sketching the relationships between clusters and the time span of the literature within individual clusters (Figure 3) and provides two metrics, the module value (Q value) and the average profile value (S value), as a basis for judging the effectiveness of the mapping. The $Q > 0.3$ clustering structure is generally considered significant, $S > 0.5$ clustering is reasonable, and $S > 0.7$ clustering results are convincing. In Figure 3, $Q=0.4665$ and $S=0.7662$, the clustering results can be considered significant and credible.

Understanding the clustering labels needs to be considered in the context of the internal literature as a whole. "#0 attention" revolves around psychological factors such as employees' attention and working memory; "#1 patient safety" and "#2 hiv" are both related to work interruptions that occur in specific fields such as medicine and are specific to this study. "#1 patient safety" and "#2 hiv" are both related to work interruptions that occur in specific areas such as medicine and are specific in nature and were not included in the scope of this study; "#3 working vacation" and "#6 work-family conflict" are both Both "#3 working vacation" and "#6 work-family conflict" are mainly based on breaks due to communication loads outside the workplace, based on vacation breaks and their effects, and are part of the category of interruptions that occur at work. "#4 gender" includes interruptions in employment mainly due to gender-related factors such as childbirth and pregnancy. The above two categories do not fall under the category of interruptions in the performance of tasks at work. "#5 degradation" is mainly related to changes in team performance and employee status recovery due to interruptions; "#7 interruption" is mainly related to management measures related to interruptions.

Based on the timeline diagram under the clustering of research areas (Figure 1) and the combing and reading of research literature under each cluster, the research between the two decades can be discussed in three categories: sources of work task interruption, impact mechanisms and outcomes, and related measures.

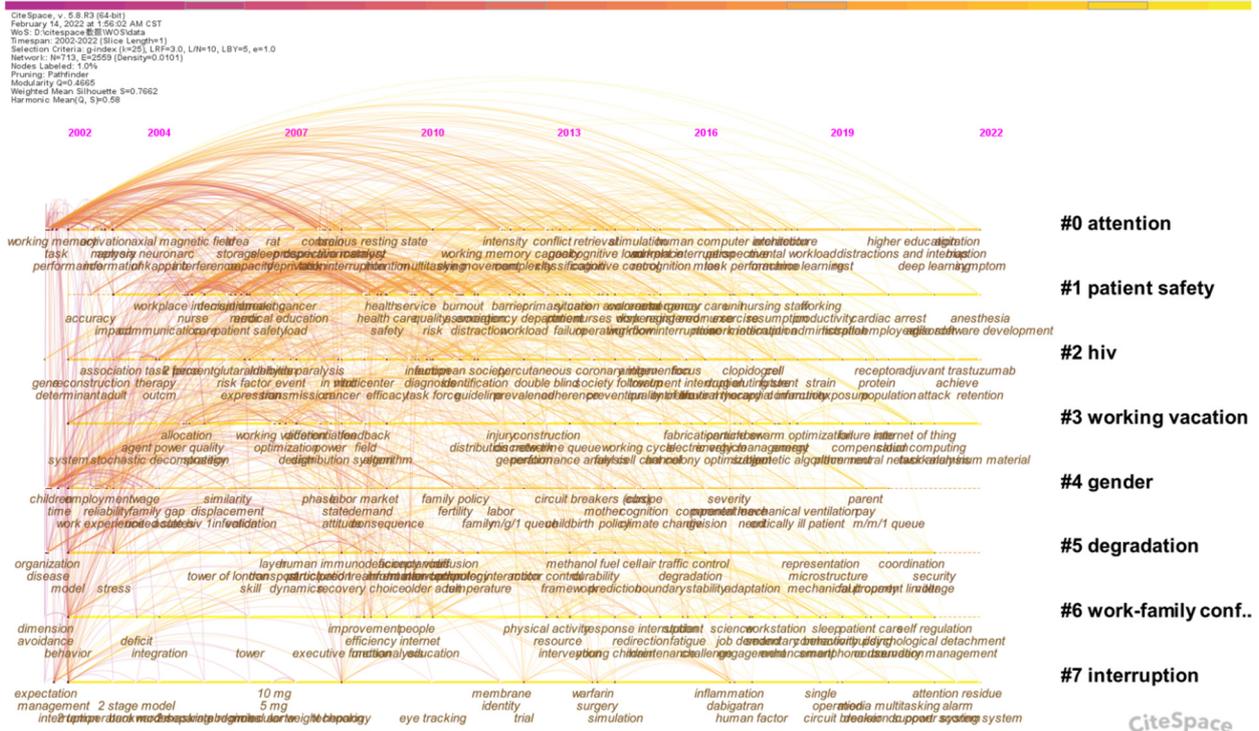


Figure 1 Timeline of work interruption research keywords 2002-2022, Source: Self-drawn by the author.

4. ANALYSIS OF RESEARCH HOTSPOTS AND TRENDS IN THE LAST TWO DECADES

4.1. Analysis of research hotspots

The number of citations reflects to some extent the hot topics and trends in the research field. Among the 10 most cited articles, excluding those related to medical consequences, the research focuses on "emotion regulation", "working memory" and "gender". This is a good example of the hot topics and foundations of work disruption research. The keywords are a distillation of the main body of the article and reflect the core content of the literature. The data collected from the literature search was imported into Citespace and analysed for subject terms and keywords to identify the hotspots of research on 'work disruption' (Figure 2). The font size in the figure represents the nodes, and the size represents the frequency of the keywords; the higher the frequency, the larger the font. In addition, the importance of the literature is generally measured in Citespace using the metric of mediated centrality, which indicates the degree to which the node is connected to other nodes in the graph. By deriving and organising the graph data, excluding tasks (centrality 0.31, 294 times) and interruptions (centrality 0.44, 419 times), the hotspot statistics of foreign work task interruption research were obtained (Table 1). The high-frequency subject terms were focused on "working memory" and "management".

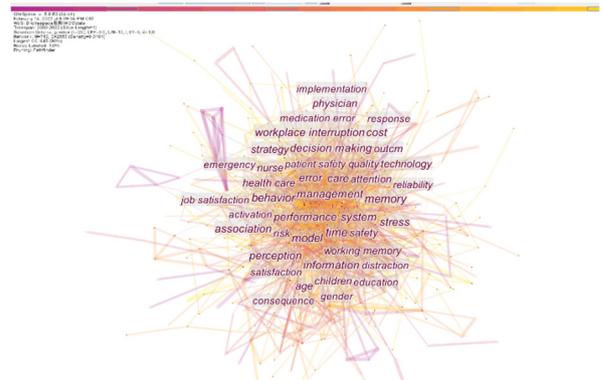


Figure 2 Analysis of work interruption research hotspots, 2002-2022.

Table 1 Work interruption research hotspots statistics 2002-2022 (centrality ≥ 0.1)

Serial number	Frequency	Centrality	Subject Headings
1	185	0.21	working memory
2	226	0.19	model
3	223	0.19	system
4	123	0.18	behavior
5	156	0.17	management
6	150	0.17	time
7	61	0.11	performance

Work task disruption research hotspots are dominated by behavioural recovery, and there is also a greater focus on the consequences of disruption and disruption management. In addition, there are also more specialist

terms related to medical and engineering interruptions in the research keywords. Work interruptions first came from research on interruptions in medical work and then extended to engineering interruptions and IT interruptions, so researchers are more inclined to focus on this aspect of interruption management to reduce the

impact of work interruptions in special areas and their effective handling at a later stage. Overall, with the literature that has been screened, there is still a wealth of research on medical interruptions, but the heat of research on task interruptions in the general workplace cannot be ignored.

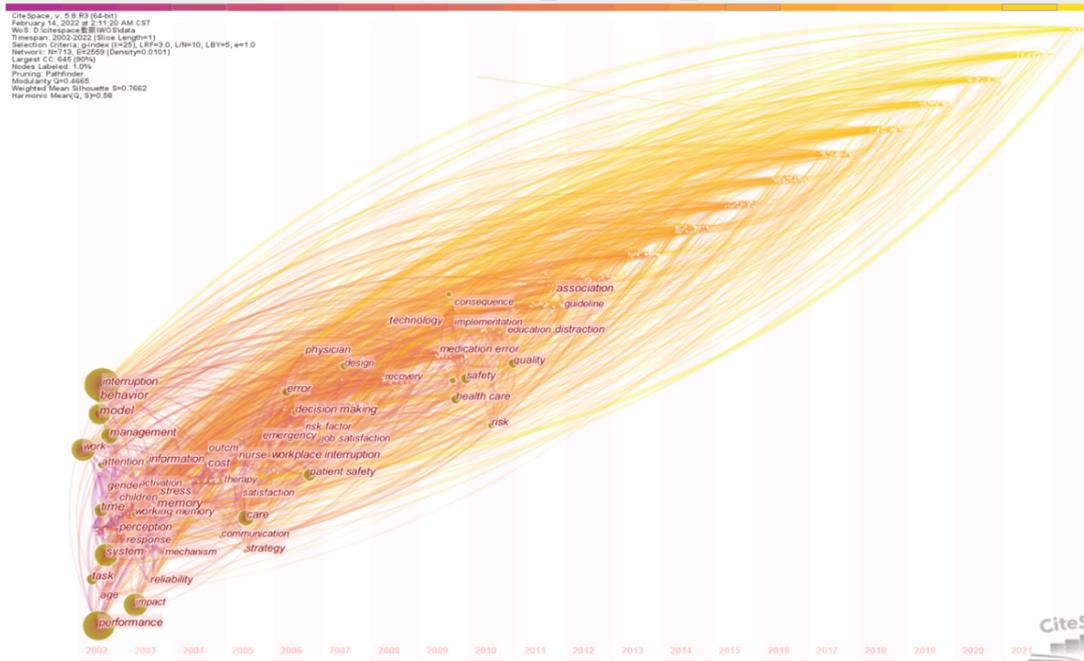


Figure 3 Time series of research keywords related to job interruptions 2002-2022.

4.2. Analysis of research trends

The Time Zone diagram (Figure 3) represents the evolution of the study in the temporal dimension, and the lines between the nodes in the diagram represent the co-word relationships between the keywords, which are collated in Table 4. The dark nodes in the subject term time series diagram (Figure 3), represent the burst term, and the Citespace burst detection can show the changes in the burst term over time, thus analysing the study trends (Table 3). It is evident that behavioural recovery and performance impact continue to dominate the research and that disruption research is still evolving dynamically. Combining the subject term time series plots and the changes in the highlighted terms, the subject terms can be divided into three time periods (Table 2).

Firstly, from 2002-2008, the research literature on work task interruptions among general employees was scarce, with early studies focusing on specific areas such as medical interruptions and engineering interruptions; secondly, from 2009-2014, the research direction was gradually refined and diversified, with high-frequency terms such as "working memory", "team performance" and "behavioural recovery" in this period. ", "team performance", "behavioural recovery", etc., and a focus on alternative perspectives of disruption - leave disruption and gender-induced employment disruption. Finally, from 2014-2021, research focuses on the

refinement of functions, firstly with an increased focus on the work-family dimension of the connection, and secondly with a climb in the literature in the area of IT disruptions due to the significant spread of the collaborative open model and rapid advances in information and communication technologies, and with terms such as "interpersonal relationships". The number of literature in the field of IT disruptions has risen due to the significant spread of collaborative open models and rapid advances in information dissemination technologies, as well as increased attention to subject terms such as "interpersonal relationships" and "boundary management."

Table 2 Analysis of research highlighting terms related to work interruptions, 2002-2022.

Keywords	Strength	Begin	End
earning	6.85	2002	2013
workplace interruption	9.99	2005	2011
emergency	9.11	2005	2014
pattern	6.01	2005	2014
communication	5.22	2009	2013
disruption	5.61	2010	2015
task interruption	6.69	2011	2016
intensive care	4.89	2011	2016
prospective memory	6.05	2013	2017

short term memory	4.8	2013	2015
task performance	5.68	2017	2018
complexity	4.95	2017	2018
environment	5.17	2018	2020
mental health	6.75	2019	2022
integration	5	2019	2022
quality of life	5.69	2020	2022

Table 3 Chronological list of work interruption research subject headings 2002-2022.

Year	Subject Headings
2009	Working memory; Human factors; Human-computer interaction; Long-term working memory; User psychology
2011	Patient Safety; Medication Errors; Intensive Care Unit; Critical Illness; Medicine Impact; Medical Errors; Strategy; Sleep; Internship
2012	Percutaneous coronary intervention; Task force; Guidelines; Antiplatelet therapy; Society
2013	Working holidays; Fixed distribution; Breaks in holidays; Balancing strategies
2008	Work; Interruptions; Children; Experience; Wage penalties Time; Gender; United States; Transition; Break in employment
2011	Performance; Recovery; Attitude; Interruption; Centrality; Framework; Team performance; Safety; Performance recovery
2015	Behaviour; Personal data; Workplace disruption; Communication load boundary management; Executive control; Social tool use
2013	Interruption; Abdominal aorta; Mammary artery; External iliac artery Management; Impact; Quality; Safety; Radiology
2014	Qualitative research; Life changing events; Interpersonal relationships; Contact
2012	Linear scheduling; Construction management; Repetitive construction; Companies; Agglomeration economies; Knowledge; Financial dependence
2007	Blood pressure; Mental health mental health; Job content; Work hazards; Psychosocial support systems; Oncology care
2014	Stem cells; Working group; Microbial contamination; Single institution; Storage

2002	Protein complex disruptors; Protein-protein interactions; Histone deacetylases; Estrogen receptors
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5. CONCLUSION

5.1. Summary

This paper uses Citespace visual analysis software to analyze the literature on work interruptions in the past 20 years, to objectively present the hot spots and trends of existing research, and to integrate the knowledge related to work interruption research abroad:

1) Work interruption has shifted from an early focus on a single medical interruption to a situation where it is cross-fertilised with multiple areas of knowledge (e.g. engineering, IT, etc.). The role of the study of work interruption theory for current employee management cannot be ignored, and with the substantial use of instant information in the workplace, the study of interruption and information dissemination is becoming increasingly topical. A more complete system has been formed in the field of work interruption research and practice abroad.

2) The research method has changed from theoretical case interpretation to qualitative and quantitative analysis based on theory. In the early days, most of the research on work interruptions was confined to interpreting theoretical concepts, summarizing design principles and putting them into design practice. In recent years interruption practices in different fields have begun to learn from each other.

3) The disciplinary background of research scholars has become diversified. Early on, work disruption was originally a cross between medicine and psychology, management, etc., and later on it also involved information technology and engineering. The management profession usually considers the behavioural perspective, the medical and engineering professions are more concerned with the consequences of disruption, and the computer technology side considers the prevention and management of endpoints from a technical perspective.

5.2. Outlook

Based on the trends evident in our review, research has shifted over time from studying static linear tasks in the laboratory to studying workplace interruptions. However, interruptions from different sources are either studied separately or pooled together to focus on frequency. This hides the interplay of multiple, nested and simultaneous interruptions that are common in today's dynamic workplace, and therefore the complexity of workplace interruptions is not well understood. The major unexplored aspect of the complexity of job

interruptions is the impact of their distribution. While the impact of work interruptions on average has been studied extensively, the impact of their distribution has been less studied. Some work interruptions occur more frequently (e.g. unexpected emails) than others (e.g. video conferencing). Mean-based studies may suggest that the former are more influential than the latter. However, it is possible that people respond in a standardised way to frequent rather than routine work interruptions. Repeated execution of these responses can help people adapt to prolonged work interruptions and thus reduce the disruptive nature of these interruptions. In this case, occasional interruptions can have a greater impact on employee work outcomes. In addition to variation in the source, the distribution of interruptions may also vary according to the time of day/week or the phase of the project. Scholars can therefore examine how this variation in interruptions affects different outcomes.

REFERENCES

- [1] Mark, G. 2015. *Multitasking in the digital age*. San Rafael, CA: Morgan & Claypool.
- [2] Mark, G., Gonzalez, V. M., & Harris, J. (2005, April). No task left behind? Examining the nature of fragmented work. Paper Presented at the Conference on Human Factors in Computing Systems, Portland, United States.
- [3] Biron, A. D., Lavoie-Tremblay, M., & Loiselle, C. G. 2009. Characteristics of work interruptions during medication administration. *Journal of Nursing Scholarship*, 41: 330-336.
- [4] Raban, M. Z., & Westbrook, J. I. 2014. Are interventions to reduce interruptions and errors during medication administration effective? A systematic review. *BMJ Quality and Safety*, 23: 414-421.
- [5] McFarlane, D. C., & Latorella, K. A. 2002. The scope and importance of human interruption in human-computer interaction design. *Human-Computer Interaction*, 17: 1-61.
- [6] Rissler, R., Nadj, M., Adam, M., & Maedche, A. 2017. Towards an integrative theoretical framework of IT-mediated interruptions. *Proceedings of the 25th European Conference on Information Systems (ECIS): 1950-1967*. Atlanta: AIS Electronic Library.
- [7] Sasangohar, F., Donmez, B., Trbovich, P., & Easty, A. C. 2012. Not all interruptions are created equal: Positive interruptions in healthcare. *Proceedings of the Human Factors and Ergonomics Society Annual Meeting*, 56: 824-828.
- [8] Biron, A. D., Lavoie-Tremblay, M., & Loiselle, C. G. 2009. Characteristics of work interruptions during medication administration. *Journal of Nursing Scholarship*, 41: 330-336.
- [9] Myers, R. A., McCarthy, M. C., Whitlatch, A., & Parikh, P. J. 2016. Differentiating between detrimental and beneficial interruptions: A mixed-methods study. *BMJ Quality and Safety*, 25: 881-888.
- [10] Mitchell, T. R., Harman, W. S., Lee, T. W., & Lee, D. Y. 2008. Self-regulation and multiple deadline goals. In R. Kanfer, G. Chen, & R. D. Pritchard (Eds.), *Work motivation: Past, present, and future: 197-231*. New York: Routledge.
- [11] Hickam, D. H., Severance, S., Feldstein, A., Ray, L., Gorman, P., Schuldheis, S., Hersh, W. R., Krages, K. P., & Helfand, M. 2003. The effect of health care working conditions on patient safety. *Evidence Report/Technology Assessment (Summary)*, 74: 1-3.
- [12] Speier, C., Vessey, I., & Valacich, J. S. 2003. The effects of interruptions, task complexity, and information presentation on computer-supported decision-making performance. *Decision Sciences*, 34: 771-797.
- [13] Relihan, E., O'Brien, V., O'Hara, S., & Silke, B. 2010. The impact of a set of interventions to reduce interruptions and distractions to nurses during medication administration. *Quality and Safety in Health Care*, 19(5): 1-6.
- [14] Fisher, C. D. 1998. Effects of external and internal interruptions on boredom at work: Two studies. *Journal of Organizational Behavior*, 19: 503-522.
- [15] Beal, D. J., Weiss, H. M., Barros, E., & MacDermid, S. M. 2005. An episodic process model of affective influences on performance. *Journal of Applied Psychology*, 90: 1054-1068.
- [16] Fletcher, K. A., Potter, S. M., & Telford, B. N. 2018. Stress outcomes of four types of perceived interruptions. *Human Factors*, 60: 222-235.
- [17] Li, S. Y. W., Magrabi, F., & Coiera, E. 2012. A systematic review of the psychological literature on interruption and its patient safety implications. *Journal of the American Medical Informatics Association*, 19: 6-12.