Evaluation of Office Fall Injuries

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Preface

You are a data scientist for a mid-sized business, in a small group of 3-4 data scientists. You've been tasked with creating a report evaluating a scenario for your business. Your colleagues will also be evaluating the same scenario, and your reports will be used in aggregate to determine a consensus (or lack thereof) on the company's action. The reports will also be used to inform downsizing that is rumored to be coming - you want to ensure your report is better than your peers so that you aren't as easy to cut.

You may talk to your peers who are assigned the same scenario, but you do not want to collaborate too closely, lest you both become targets of the rumored layoffs.

I've scaffolded this report for you to make this process easier - as we talk about different sections of a report in class and read about how to create similar sections, you will practice by writing the equivalent section of your report.

The basic steps for this task are as follows:

- Identify the research question from the business question
- Identify data set(s) which are (1) publicly available (you don't have a budget to pay for private data) and (2) relevant to your task
  - (HW Week 6) Document your data sets in `draft-data-doc.qmd`
- Conduct a statistical analysis to support your answer to your research and business questions
  - Write a methods section for your business report corresponding to your statistical analysis
  - (HW Week 9) Draft of results section of business report with relevant graphics/visual aids in `draft-results.qmd`
- Write your report
  - (HW Week 10) Draft of Intro/Conclusion sections in `draft-intro-conclusions.qmd`

  - (HW Week 11) Draft of Executive summary section in `draft-exec-summary.qmd`

- Revise your report
  - (HW Week 12 – not turned in) Revise your report
  - (HW Week 13) - Rough draft of report due. Create one or more qmd files for your report (you can overwrite or delete intro.qmd and summary.qmd), include the names of each file (in order) in `_quarto.yml`. You should use references (edit references.bib and use pandoc citations). Make sure your report compiles and looks reasonable in both html and pdf.
  - Develop a presentation to go along with your report (Week 13). Create slides for your report using quarto.

- Peer revise reports
  - Peer revise reports
  - (HW Week 14) - Make edits to your report from comments received from peer review

- Final report & presentation due

1 Introduction

This is a book created from markdown and executable code.

See Knuth (1984) for additional discussion of literate programming.

2 Summary

In summary, this book has no content whatsoever.

References

CDC. 2024. "About Falls in the Workplace." *Falls in the Workplace*. https://www.cdc.gov/niosh/falls/about/index.html.

Knuth, Donald E. 1984. "Literate Programming." *Comput. J.* 27 (2): 97–111. https://doi.org/10.1093/comjnl/27.2.97.

"Recordkeeping - Non-Mandatory Appendix a to Subpart b – Partially Exempt Industries | Occupational Safety and Health Administration." n.d. https://www.osha.gov/recordkeeping/presentations/exempttable.

"Survey of Occupational Injuries and Illnesses Data." n.d. *Bureau of Labor Statistics*. https://www.bls.gov/iif/nonfatal-injuries-and-illnesses-tables.htm.

"TABLE 1. Incidence Rates of Nonfatal Occupational Injuries and Illnesses by Industry and Case Types, 2023." n.d. *Bureau of Labor Statistics*. https://www.bls.gov/web/osh/table-1-industry-rates-national.htm.

"What Are the Top Injuries in a Typical Office and How Can You Avoid Them? | Environmental Health & Safety | Albert Einstein College of Medicine." 2012. https://web.archive.org/web/20121012001130/http://www.einstein.yu.edu/administration/environmental-health-safety/accident-injury-reduction-campagin/top-injuries.aspx.

A Draft: Data Documentation

1. Office Injury Statistics - Rethink What You Know About Office Injuries

   Link

   Overview: States common causes and statistics of office injuries. They make the claim that falling is the most common office related accident, and that office workers are 2 to 2.5 times more likely to suffer an injury than a non-office worker (citing the CDC). It also defined what office falls include.

   Source: Aftermath

2. Non-Fatal Occupational Falls on the Same Level

   Link

   Overview: Comparing falls between industries, and categorizing falls that are "on the same level". It looks at differences in injuries between males and females, as well as by age and industry. Within each fall category, it also logs compensation costs that resulted from occupational falls.

   Source: National Library of Medicine

3. OSHA

   1. Partially Exempt Industries

      Link

      Overview: A list of industries that are partially exempt from OSHA, meaning they are not required to keep injury and illness records. This is relevant because it may cause gaps in numbers on industry injury records. Notably, many of the exempt employers can be categorized as office jobs.

   2. Census of Fatal Occupational Injuries Summary, 2023

      Link

      Overview: Commonly used statistics over fatal occupation injuries, broken into categorical statistics about work characteristics, private industries and occupation. This is a good source when comparing fatal injuries and non-fatal injuries in office settings.

4. Injuries, Illnesses, and Fatalities

   Link

   Overview: Numbers and charts on total nonfatal work injury and illnesses (specifically in private industries).

   Source: U.S. Bureau of Labor Statistics

B Draft: Results

B.1 Descriptive Statistics

In my analysis I worked with two datasets from the U.S. Bureau of Labor Statistics. I first used 2021-2022 data covering work injuries and illnesses detailed by source and industry "Survey of Occupational Injuries and Illnesses Data" (n.d.). Secondly, I examined workplace recordable injury rates by industry using 2023 data "TABLE 1. Incidence Rates of Nonfatal Occupational Injuries and Illnesses by Industry and Case Types, 2023" (n.d.). I categorized the data into office and non-office jobs based on the NAICS codes. I choose to make decisions on the 3-digit level of the codes, so there are several sub-industries with 4 and 5-digit codes that are within the chosen "office" industries. The category of office jobs includes the following:

- Information (511, 517, 518, 519)
- Finance and Insurance (521, 522, 523, 524)
- Real Estate (531, 532)
- Legal Services and Accounting (541)
- Management (551)
- Administrative Support (561).

I made the assumption that a blank observation (indicated by a dash) represented a zero, not an NA. Entries with actual NA values were removed.

For the first dataset, there were 2936 raw observations, and 258 sections at the 3-digit NAICS code level. After I split the data, there were 83 non-office industries and 13 office industries (listed above).

For the second dataset, it contained 1074 raw observations, 87 subsections with 74 non-office and 13 office.

B.2 Primary Findings

B.2.1 Mean Slips and Falls

The definition of "slips" in this dataset is a trip without a fall, which I believe is still relevant to the company's concern of fall-related safety. To reiterate, this dataset only records incidents that result in days away from work or job restriction, which I am generalizing to mean the incidents resulted in injury.

In 2023, the mean number of falls in non-office industries was 3361, and the mean for office industries was 2116. The mean number of slips in non-office industries was 949, and the mean was 695 for office industries (Figure 1). Non-office had, on average, about 1.5 times the number of falls and about 1.4 times more slips. This contradicts the previous claim of office workers being 2 to 2.5 times more likely than non-office workers to suffer an injury from a fall.

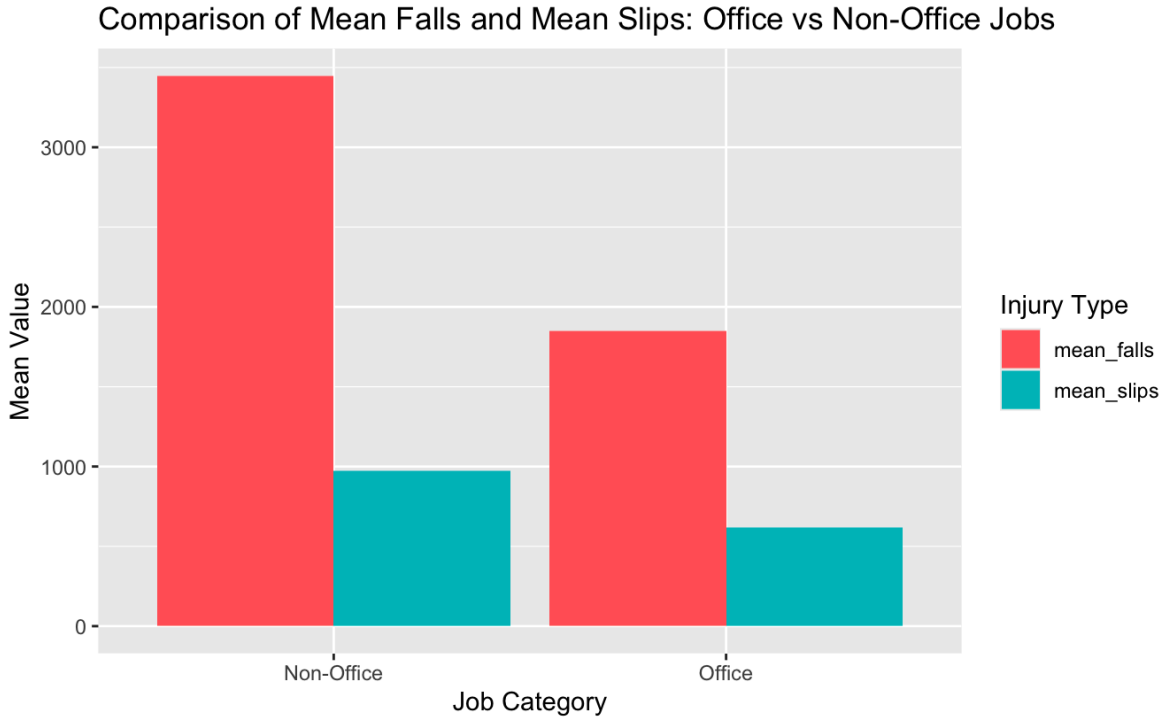

Figure 1: The mean number of slips and falls for both non-office and office industries. The mean number of falls/slips can also be interpreted as the mean number of injuries resulting from a workplace fall/slip.

B.2.2 Total Recordable Injury Cases

Non-office industries experienced a average rate of 3.06 workplace injuries, and office industries experienced an average of 0.93 workplace injuries. On average, non-office jobs reported was about 3.3 times the number of total recordable cases compared to office jobs (Figure 3).

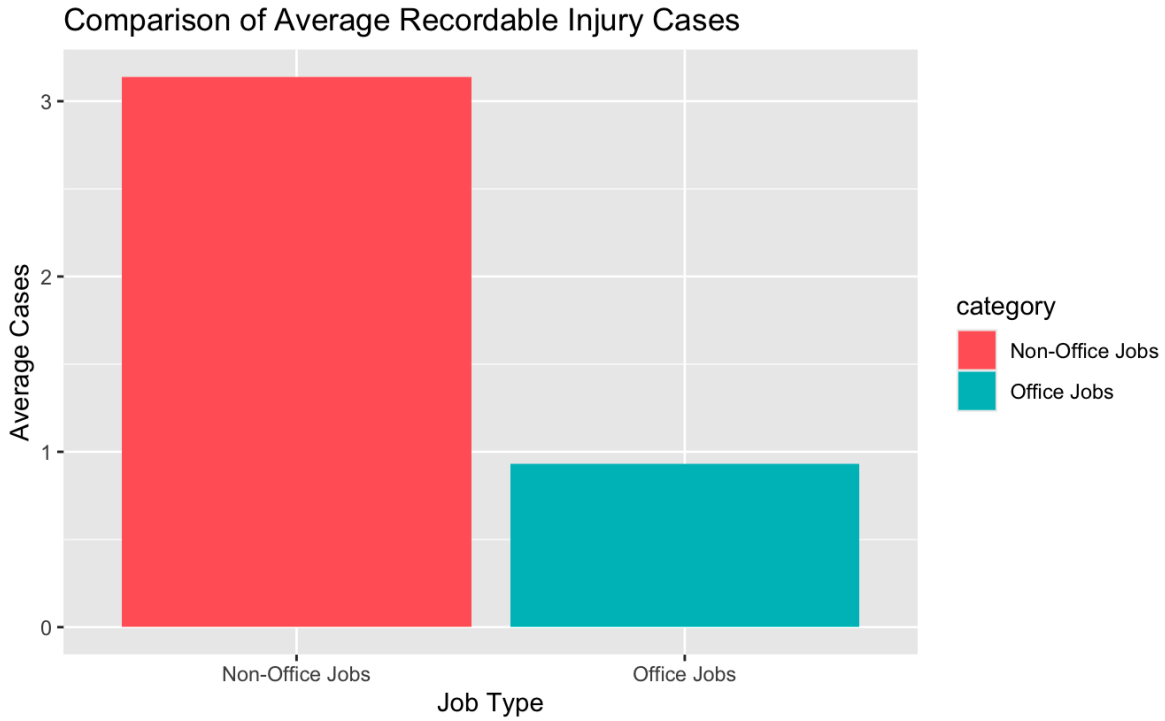

Figure 3: Average number of recordable injuries in both non-office and office industries in 2023

B.2.3 Injury Severity (Cases with Days Away from Work)

Non-office jobs also had a greater proportion of injuries resulting in time away from work. For non-office industries, the average number of injuries resulting in days away from work was 1.20. For office industries, the average was 0.36. Similarly to the total number of cases, the average for non-office industries was about 3.3 times larger than that of the office industries (Figure 4). This can be used to make inference on the average severity of the injuries that non-office workers and office workers are acquiring.

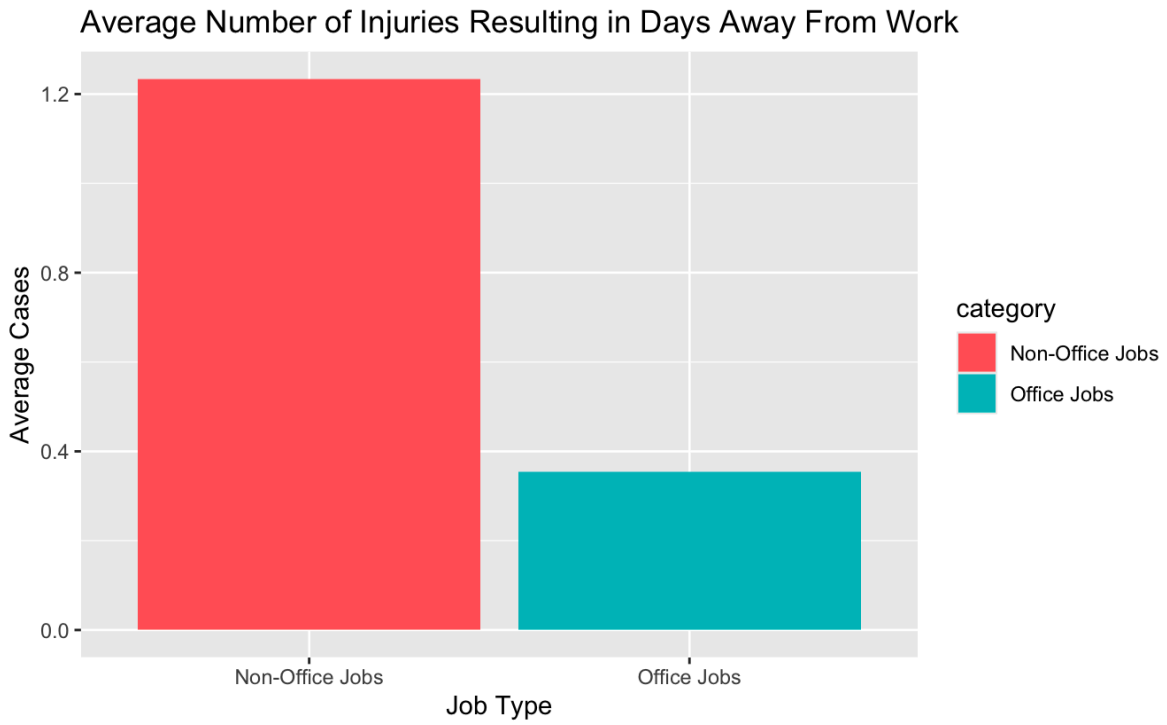

Figure 4: Average number of 2023 recordable injuries that resulted in days away from work in both non-office and office industries

B.2.4 Most Common Office Injuries

By visualizing the total reported injury cases (Figure 5), we can see the which type of injuries are most common. Falls on the same level are the second most common injury type reported in office spaces with 30,960 total cases in 2023.

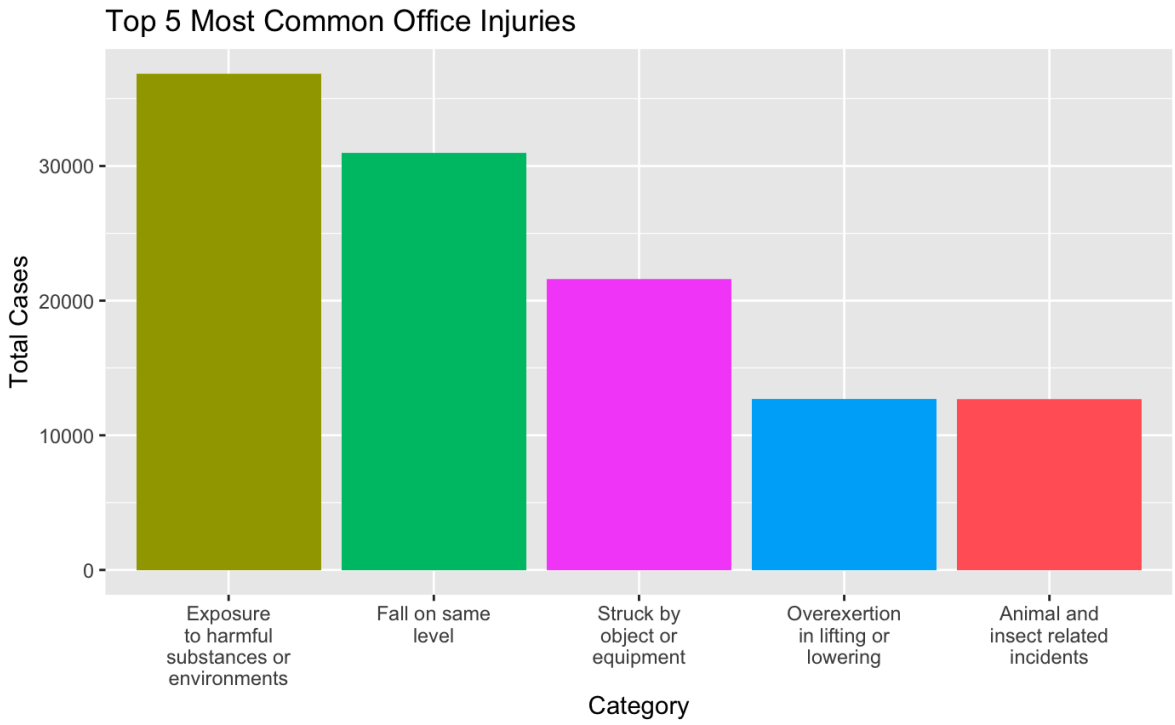

Figure 5: Total injury cases reported for office injuries by injury type. Only the 5 most common injury categories shown.

C Draft: Intro/Conclusions

Safety in the workplace is the most important priority for any company to have. No matter the industry, location, or project, taking measures to ensure workers are not at risk of injury is a necessity. It is both the responsibility of management and workers to stay informed and up-to-date with safety regulations. These rules and regulations can look very different industry to industry. In an office setting, some may think safety is not a prioritized concern, but that is far from the truth. Falls are the leading cause of injuries in an office setting "Survey of Occupational Injuries and Illnesses Data" (n.d.), and it is important to understand the risks, causes, and ways to reduce the probability of this type of injury.

A 2012 article from The Albert Einstein College of Medicine cited the Center of Disease Control and Prevention with the claim that "office workers are 2 to 2.5 times more likely to suffer an injury from a fall than non-office workers" "What Are the Top Injuries in a Typical Office and How Can You Avoid Them? | Environmental Health & Safety | Albert Einstein College of Medicine" (2012). An analysis into this claim may reveal insight on the source and interpretation of the original CDC data. It is possible this claim has two slightly different meanings:

1. Office workers are more likely to suffer an injury given they had a fall compared to non-office workers.
2. Office workers are more likely to have a fall that results in an injury compared to non-office workers.

In the original claim and this report, any reference to "falls" explicitly means falls on the same level, and excludes injuries resulting from falls to a different level (which are reported in separate categories in CDC and US Bureau survey data). The following analysis will compare the number of falls between office and non-office workers, and also the number of falls resulting in injury between the two groups. The difference between the two interpretations lead to two separate concerns: are office workers at higher risk of falling or higher risk of suffering an injury from a fall? It is also important to remember this data and claim is from 2012 at the latest, and the workplace has changed very much in the last decade.

While the claim may have held truth at the time, based on my research and analysis of 2023 CDC data, this claim is false in both interpretations. Non-office workers are about 1.5 times more likely to suffer an injury from a fall than an office worker.

D Conclusion

The evidence found using the US Bureau of Labor Statistics data supports an overwhelming conclusion that is opposite than that of the original claim. While the original CDC data was unavailable to public access, the available data used for this analysis is reliable and established.

Using the 2023 survey of occupational injuries, I found that non-office workers are about 1.5 times more likely to suffer an injury from a fall, and also 1.4 times more likely to slip without falling than an office worker "Survey of Occupational Injuries and Illnesses Data" (n.d.). This evidence directly opposes the original claim, and suggests that office workers are not at a higher risk of suffering injuries from falls than non-office workers. Generalizing to all types of injuries, I found that non-office industries have 3.3 times the number of recordable injuries compared to office industries "TABLE 1. Incidence Rates of Nonfatal Occupational Injuries and Illnesses by Industry and Case Types, 2023" (n.d.). Similarly, the same data revealed that non-office industries had 3.3 times the number of recordable injuries that specifically required days away from work. The rate of recordable injuries and total recordable injuries with time away from work suggests that not only are non-office workers more likely to be injured at work, but also that the severity distribution of these injuries are higher than the injuries of office workers. This evidence combined builds a strong case against any claim that office workers are more likely to suffer an injury from a fall than a non-office worker.

Here is another way to think about this main conclusion: If a construction site and an accounting office have the same number of falls, the severity of those falls likely vary drastically. In many ways, we would hope to see less falls in the construction site than the office, because of the associated risk in the setting. According to the CDC , we see the highest number of workplace falls and fall injuries in construction, educational and health services, ambulance services, building maintenance, and transportation services CDC (2024).

We should consider the fact that many industries filled predominantly by office jobs are partially exempt from OSHA record keeping because of the low incident rate "Recordkeeping - Non-Mandatory Appendix a to Subpart b – Partially Exempt Industries | Occupational Safety and Health Administration" (n.d.). This may lead to a bias in the data regarding how many fall injuries are reported in office industries. On the other hand, many office workers may be less conscious of OSHA regulations, and therefore increase the likelihood of falls. Both these factors may lead to different kinds of bias in the data, which could be addressed in the future by more focused studies into office workplace injuries, and also a stress on following OSHA safety regulations in all workplaces.

It should be acknowledged that the definition of "office" jobs and industries is, at times, subjective, and categorizing all the recognized NAICS industries into the two groups is not a perfect system. Some jobs, such as real estate, may require workers to have an office but also include extensive work outside an office. While there could be a debate on some industries being included or not, I believe the evidence is conclusive enough for the variability to not make a significant difference. Future work could compare results from different combinations of NAICS codes to see by how much the final conclusion changes.

Despite the evidence that office workplaces are at much lower risk for falls and overall injuries, the second most common injury in offices is still falls on the same level "Survey of Occupational Injuries and Illnesses Data" (n.d.). Given that an office industry reports an injury, there is about an 18.5% chance the injury is a fall on the same level. The CDC cites the following reasons as the most common causes of falls in the workplace CDC (2024):

- Unprotected edges
- Unsafely positioned ladders
- Misused fall protection
- Water, grease, and other contaminants on the floor
- Clutter and tripping hazards in walkways
- Irregularities in the floor and wall openings

Appropriate steps taken in an office could greatly reduce the risk of any workers falling, such as safety training, proper use of ladders, and cleaning up/labeling any floor area with liquid on it. It is a company's responsibility to ensure all parts of the building are using accessible architecture (ramps, elevators, wide doorways, etc.) so no employees are put in a position to take unnecessary risks.

This report concludes with strong evidence to say that office workers are not at a higher risk to suffer an injury from a fall than non-office workers. That being said, office workers still face the risk of injury if proper safety regulations are not followed. Every company highly values the well-being of their employees, and should always take the proper steps to ensure a comfortable and safe work environment.

E Draft: Executive Summary

For the last sixty years, Halpert & Co. has prioritized the safety of its employees in all areas of the company. There has been a recent rise in concern about the risk of injury in office spaces due to discovered research. A 2012 article from The Albert Einstein College of Medicine cited the Center of Disease Control and Prevention with the claim that "office workers are 2 to 2.5 times more likely to suffer an injury from a fall than non-office workers" "What Are the Top Injuries in a Typical Office and How Can You Avoid Them? | Environmental Health & Safety | Albert Einstein College of Medicine" (2012). This claim was found to be unverifiable, as the source CDC data is not available.

Through an analysis of 2023 survey data from the US Bureau of Labor Statistics, an opposing result was found of office workers being about 1.5 times less likely to suffer an injury from a fall than a non office worker "Survey of Occupational Injuries and Illnesses Data" (n.d.). Overall, non-office industries report 3.3 times the number of injuries as office industries, as well as having 3.3 times the number of injuries that result in needing time away from work "TABLE 1. Incidence Rates of Nonfatal Occupational Injuries and Illnesses by Industry and Case Types, 2023" (n.d.). This strongly suggests non-office workers are at higher risk for both being injured and suffering an injury of higher severity.

Despite the conclusion that office workers are at lower risk of injuries and falls, stronger safety policies in office spaces would not be a waste of time or resources. About 18.5% of all office injuries reported are falls on the same level, with some of the common causes of the fall being misusing ladders, water or contaminants on floors, and tripping hazards in walkways CDC (2024). Implementing safety training to use equipment and proper handling of spills and clutter hazards can greatly reduce the risk of fall injuries in the office.