



SURVEILLANCE BRIEF

Wisconsin Occupational Health and Safety Program

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Winter Work-Related Injuries: Slips, Trips, and Falls in Wisconsin (2000–2022)

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SUMMARY — Slips, trips, and falls are among the most commonly reported work-related injuries. Although these injuries are preventable, hundreds of thousands of people in the United States are injured badly enough to require days off work each year, and hundreds of people are killed. A slip, trip, or fall does not need to occur from an elevated height to cause severe injury or death. In Wisconsin, slippery conditions caused by cold weather are likely responsible for an increase in work-related slips, trips, and falls in the winter months. This brief examines Wisconsin worker's compensation claims for injuries suffered in the colder months (October 1–April 30) during 2000–2022, and finds that injury rates varied significantly by age, gender, amount of work time spent outdoors, industry, and occupation. Employers in Wisconsin should take particular care to protect workers during the colder months.

Background

Slips, trips, and falls are a major concern for workers across the United States; in 2020 they comprised 18% of all nonfatal work-related injuries that resulted in lost work time.¹ According to the Occupational Safety and Health Administration (OSHA), slips, trips, and falls cause nearly 700 work fatalities per year in the United States.² In Wisconsin, 13 people were killed at work as a result of a slip, trip, or fall in 2021.³ The same year, 38,300 Wisconsin workers suffered a slip, trip, or fall that resulted in missed time at work, transfer, or restricted activities.³

These three types of injuries are commonly grouped together in statistical analyses. Their definitions are based on the type of movement the body undergoes and the

trajectory of the fall. All three are defined by OSHA in relationship to what's termed the "working-walking surface," which is any surface upon which a worker walks or performs work. Working-walking surfaces can include stairways, ramps, floors, and outdoor surfaces. A slip occurs when a person's foot doesn't have enough traction on the walking-working surface, which causes them to suddenly lose their balance. A trip happens when a person's leg or foot comes into contact with a hazard (either an object or an uneven surface) that arrests the movement of the lower body while momentum carries the upper body forward. It doesn't take much of an impediment to cause a trip; irregularities as small as 5mm may be sufficient to cause a trip.⁴ Both slips and trips can cause falls.²

A fall happens when a person's center of gravity shifts unexpectedly and their body contacts either the working-walking surface or a nearby object or wall. There are two types of falls: same-level falls and elevated falls. In a same-level fall, the person lands on the same working-walking surface they were working on. In elevated falls, however, a person falls from one level to another, such as from a ladder to the ground below.² Elevated falls tend to be more deadly; they are the third-leading fatal workplace event in the United States.⁵ Although elevated falls are rightfully frightening, same-level falls are problematic, too; although fewer people are killed at work in same-level falls, more than twice as many lose work time due to same-level falls each year.⁶

Common risk factors for falls have been well-documented. They include: age, lower body weakness, vitamin D deficiency, difficulties with walking or balance, alcohol and drug use (including prescription and over-the-counter medication), vision problems, foot pain, poor footwear, and hazards such as slippery or uneven surfaces.⁷ In addition, distraction has been shown to cause an elevated risk of injury.⁸ Most falls are caused by a combination of risk factors. The more risk factors a person has, the greater their chances of falling.

Temperature is also a factor in a person's risk of slip, trip, or fall. Between October 1 and April 30 each year, Wisconsin temperatures vary, but tend to be cold. The daily average temperatures for each month during period of this brief were:

October 2000–2022: 47.1°F
November 2000–2022: 34.4°F
December 2000–2022: 21.3°F
January 2001–2022: 16.3°F
February 2001–2022: 17.7°F
March 2001–2022: 30.7°F
April 2001–2022: 43.4°F⁹

On any day with temperatures below freezing (32°F) there is an elevated risk of slipping because of the way the weather affects the working-walking surface. Studies have linked slipperiness with weather phenomena like freezing, melting, condensation, and precipitation of all types.¹⁰ Slipperiness can also be created by mechanical means, when pedestrians or cars compress the snow or

plows polish a snowy surface into a dense, almost ice-like surface. Slippery surfaces can also be deceptive; for example, they can be obscured by a light dusting of snow. For this reason, two or three days after an icy day, there may be a spike in slip rates when workers let their guards down because the surface doesn't appear to be slippery.¹⁰

Slips happen more commonly where there is heavy pedestrian or vehicular traffic in cold weather, and snow and ice can become packed down. Slips also happen more often when there is a sudden drop in temperature or a severe storm. Heavy traffic or severe weather may contribute to slipperiness because they cause such difficulty for snow and ice removal crews.¹⁰

Indoor surfaces can also become slippery as a result of cold weather when water, ice, snow, or slush are brought inside by people or vehicles.¹¹

For purposes of this brief, we include slips, trips, and falls from worker's compensation claims for people between ages 18 and 64 years that met both of the following criteria:

- The injury occurred in Wisconsin's colder months (October 1–April 30) during 2000–2022
- The injury was coded in the claim as a slip, trip, or fall and the cause of injury or injury description used the word "ice" or "snow."

To analyze the data within this group of claims, we used standardized occupation codes (SOC) and labelled industries according to the North American Industry Classification System (NAICS).

Two or three days after an icy day, there may be a spike in slip rates when workers let their guards down because the surface doesn't appear to be slippery.



Data and analyses: worker age

During the study period, 33,597 slip, trip, or fall claims were reported to the division of Workers Compensation for an average of 1,487 claims per year [range: 845-2,827]. The claimants’ ages are compared in Table 1:

TABLE 1. Age rate ratio, worker’s compensation claims, Wisconsin’s cold months, 2000–2022.

Age category	Number of claims	Percentage (%)	Rate (claims per 1,000 workers)	Rate ratio	95% Confidence interval
18-24	1,561	4.8	4.11	—	—
25-35	4,765	14.7	7.77	1.89	1.78, 2.00
35-44	7,319	22.5	11.84	2.88	2.73, 3.04
45-54	10,323	31.8	16.9	4.11	3.89, 4.33
55-64	8,538	26.3	15.03	3.65	3.46, 3.86

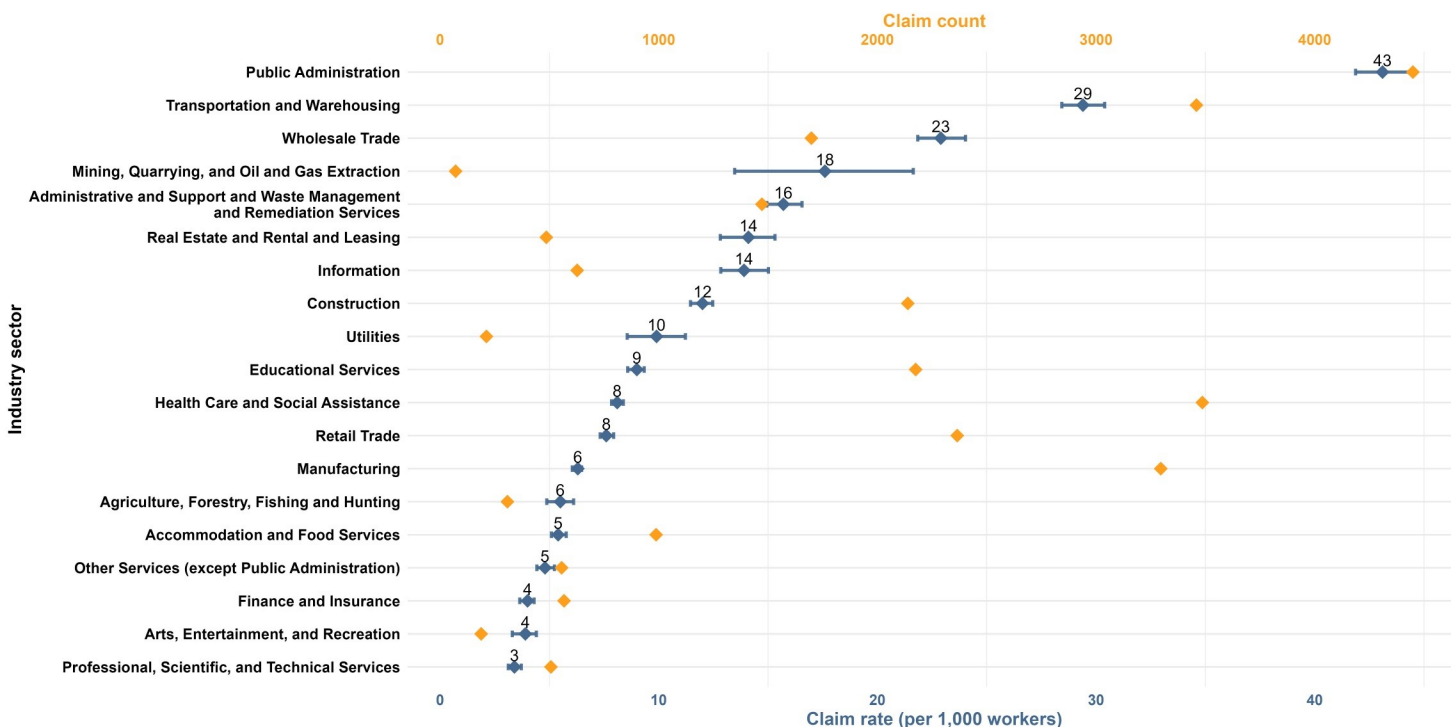
The risk of incurring these injuries increased with age with the workers aged between 45 and 64 years about four times as likely to make a claim due to a slip, trip, or fall than workers aged 18–24. This is a case in which experience on the job may not be a protective factor. The reasons for older workers to be more susceptible to slips, trips, and falls are many and complicated, and will vary with each person’s medical and personal history. Meanwhile, according to the Bureau of Labor Statistics (BLS), the age of the Wisconsin workforce is rising along with the advancing age of Wisconsin’s overall population — in 2023 Wisconsin is one of just 14 states with a median age over 40. Projections from BLS suggest that we can expect worker age to continue to increase, as the large group of people born between 1946 and 1964 continue to participate in the labor force. As of the 2021 American Community Survey, 16.7% of Wisconsin residents over the age of 65 were still employed. It is, therefore, more important than ever for employers to protect their workers in cold months. An aging workforce will require more safety reminders, will rely on careful surface preparation in winter, and may need to modify the nature or speed of their work on slippery days to prevent injury.



Data & analyses: industry and occupation

Using worker's compensation claims data, a useful linkage can be made between a person's injury and their work. Slips, trips, and falls occur more often in some industries than others, as is shown in Figure 1:

FIGURE 1. Claim count and rate per 1,000 workers by industry sector, Wisconsin's cold months, 2000–2022.



The Wisconsin industry sectors with the highest claim count (orange) were Public Administration, Health Care and Social Assistance, Transportation and Warehousing, and Manufacturing. However, Public Administration and Transportation and Warehousing were the industry sectors with the highest claim rates (blue), with 43 and 29 claims per 1,000 workers respectively. Within the Public Administration sector are many people who work outdoors for the government, such as parks and recreation, public safety, waste management, and groundskeeping personnel. The Transportation and Warehousing sector also includes thousands of people whose work tends to take place outdoors or in vehicles where the weather affects their level of risk. Further detail on the types of work performed in these sectors can be found in Figures 2 and 3 (next page).



FIGURE 2. Claim count and rate per 1,000 workers by major occupation groups, Wisconsin's cold months, 2000–2022.

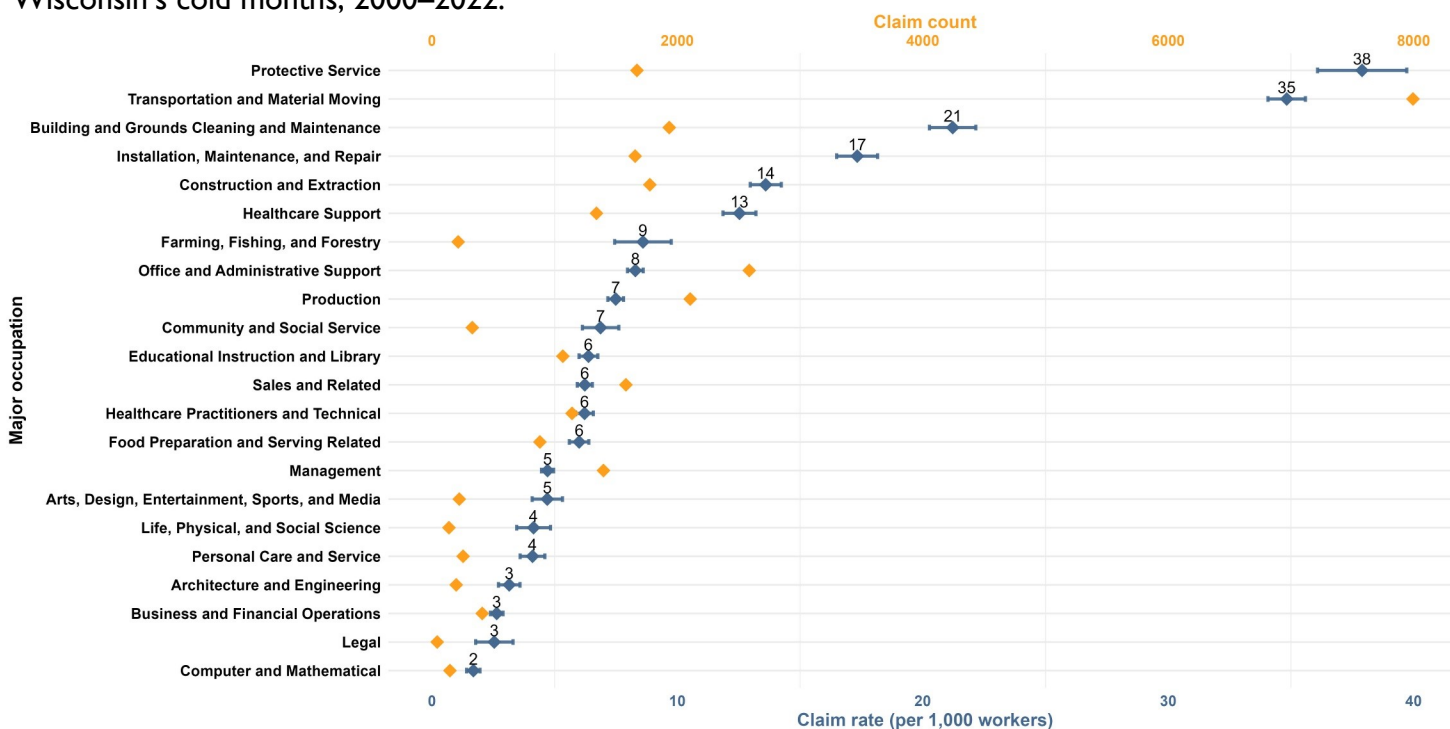
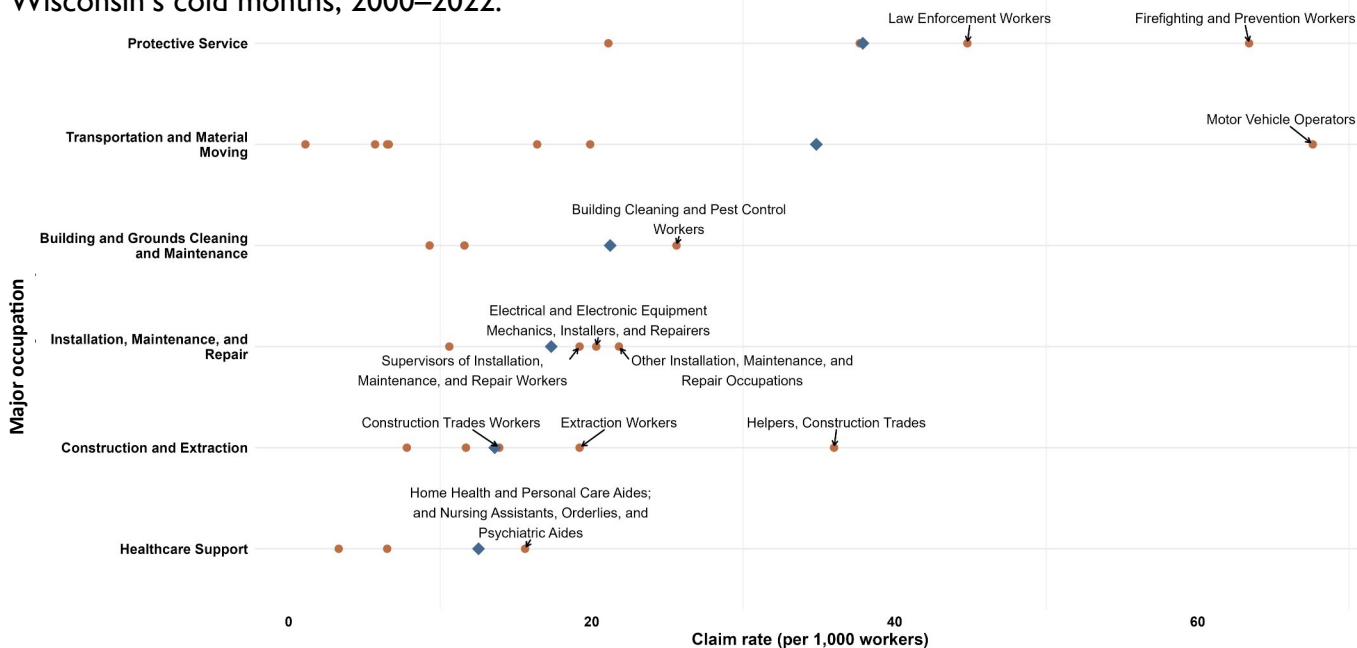


FIGURE 3. Claim rate per 1,000 workers in specific occupations within the major occupation groups, Wisconsin's cold months, 2000–2022.

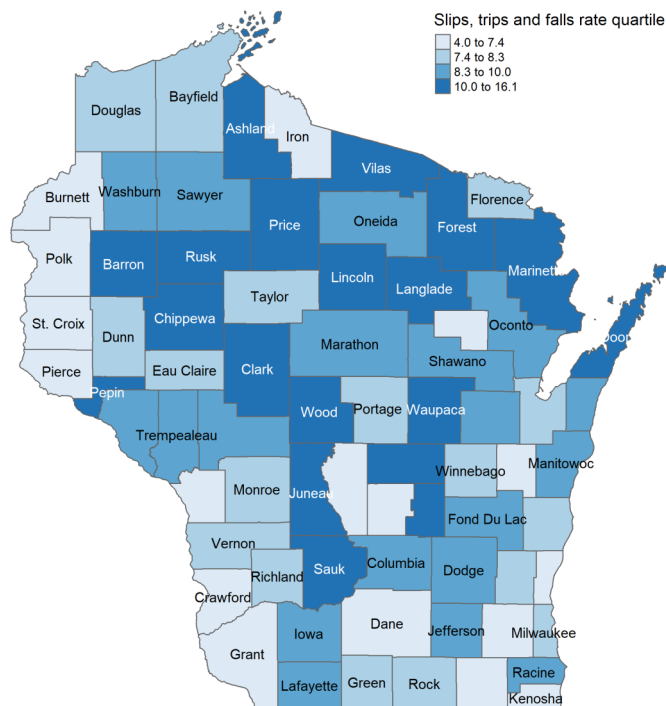


Across industries, the most-affected major occupation group was the Transportation and Material Moving workers, who claimed 27.5% of all the slip, trip, and fall injuries. Among each major occupation group, the risk is not evenly distributed, as shown in Figure 3. Motor Vehicle Operators stand out with a very high claim rate at 67.6 per 1,000 workers. High claim rates were also found among Firefighting and Prevention workers (63.4), Law Enforcement workers (44.8), and Helpers, Construction Trades (36.0). It is difficult to think of many risk factors these workers have in common other than their tendency to be outdoors and to be exposed to the weather.

Slips, trips, and falls by county

Workers filed compensation claims for slips, trips, and falls in every Wisconsin county during 2000–2022. There were differences in claim rates and counts among the counties as shown in Figures 5 and 6:

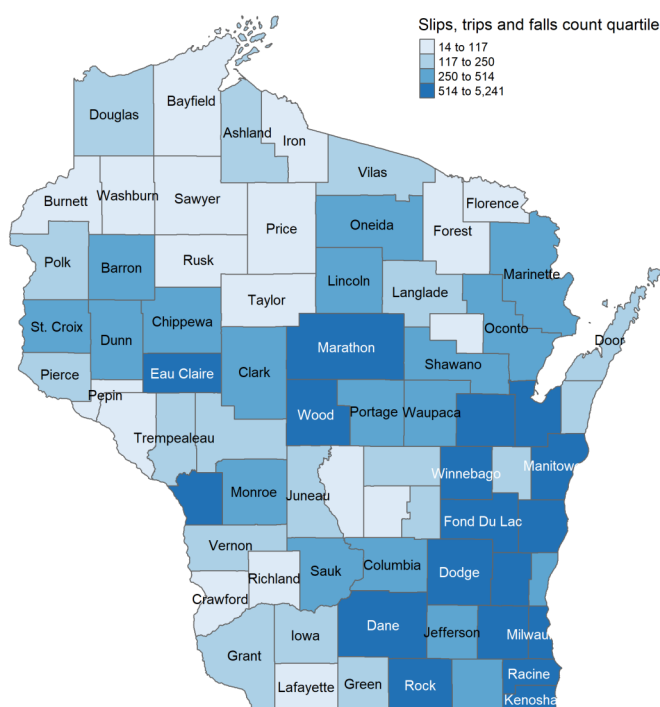
FIGURE 5. Worker’s compensation rate of claims for slips, trips, and falls, Wisconsin’s cold months, 2000–2022



Claim rates tend to be higher in the parts of the state close to or north of the 45th parallel, which runs across Chippewa, Marathon, and Door counties. Northern latitudes are colder, and therefore may experience more days of freezing and potentially slippery temperatures than southern areas.

Weather is also influenced by elevation, which is a factor in both temperature and precipitation. Temperature decreases by 3.56°F per 1,000 feet of altitude, and precipitation increases with altitude. Many of Wisconsin’s northern counties also boast our state’s highest elevations; for example, Price County’s elevation averages over 1,500 feet, compared with Milwaukee county’s average of just over 600 feet.¹³

FIGURE 6. Worker’s compensation claim counts for slips, trips, and falls, Wisconsin’s cold months, 2000–2022



Unsurprisingly, the number of workers’ compensation claims tends to be highest in counties with larger populations. These are mostly concentrated in the south and southeast, and include a few central counties. Almost all of the 18 counties with 356 or more slips, trips, and falls, fall within the top quartile of Wisconsin counties by population. Dodge (pop. 88,282), Manitowoc (pop. 81,172) and Wood (pop. 73,933) counties are the exceptions, with claim counts in the top quartile, but populations not in the top quartile.

Wisconsin’s counties with the smallest populations had the lowest claim counts. There are a couple of exceptions: Ashland (pop. 16,039) and Green Lake (pop. 19,220)¹⁴ counties are in Wisconsin’s lowest quartile by population, but each had more than 80 slip, trip, and fall claims, placing them in the second-lowest quartile.

Conclusion

Winter slips, trips and falls are common causes of injury for many Wisconsin workers. Such injuries are harmful and costly for both workers and employers. Workers who spend significant time outdoors or in transit are at particularly high risk of these injuries, but any worker can be affected. Fortunately, there are many simple interventions which can help prevent such injuries. Employers can make sure that indoor surfaces near entryways are covered with rugs and kept dry, while outside surfaces are quickly and regularly cleared, sanded, or de-iced. Both settings should be kept free of obstacles that workers could trip over. Employers can also frequently remind workers to slow down and walk like a penguin on icy days — campaigns to normalize basic precautions can be effective. Workers can use weather-appropriate footwear and take extra time to exercise caution when entering or exiting vehicles and buildings or walking outdoors. Proper precautions can keep workers on their feet.

References

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Recommended resources

[How to avoid winter slips and falls \(Mayo Clinic\)](#)
[OSHA's Winter Preparedness](#)
[Avoiding the slip: Winter fall prevention \(Mayo Clinic\)](#)
[Prevent falls on snow and ice: Walk like a penguin \(desmoines.edu\)](#)
[Safe Winter Driving \(City of Madison, Wisconsin\)](#)
[A CDC Compendium of Effective Fall Interventions: What Works for Community-Dwelling Older Adults, 4th Edition \(Fall Prevention | Injury Center | CDC\)](#)
[Falls Prevention for Older Adults \(Wisconsin Department of Health Services\)](#)

About the Wisconsin Occupational Health and Safety Program

Our program is your source for occupational health and safety-related data for the Wisconsin workforce. Learn more at dhs.wisconsin.gov/occupational-health.

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