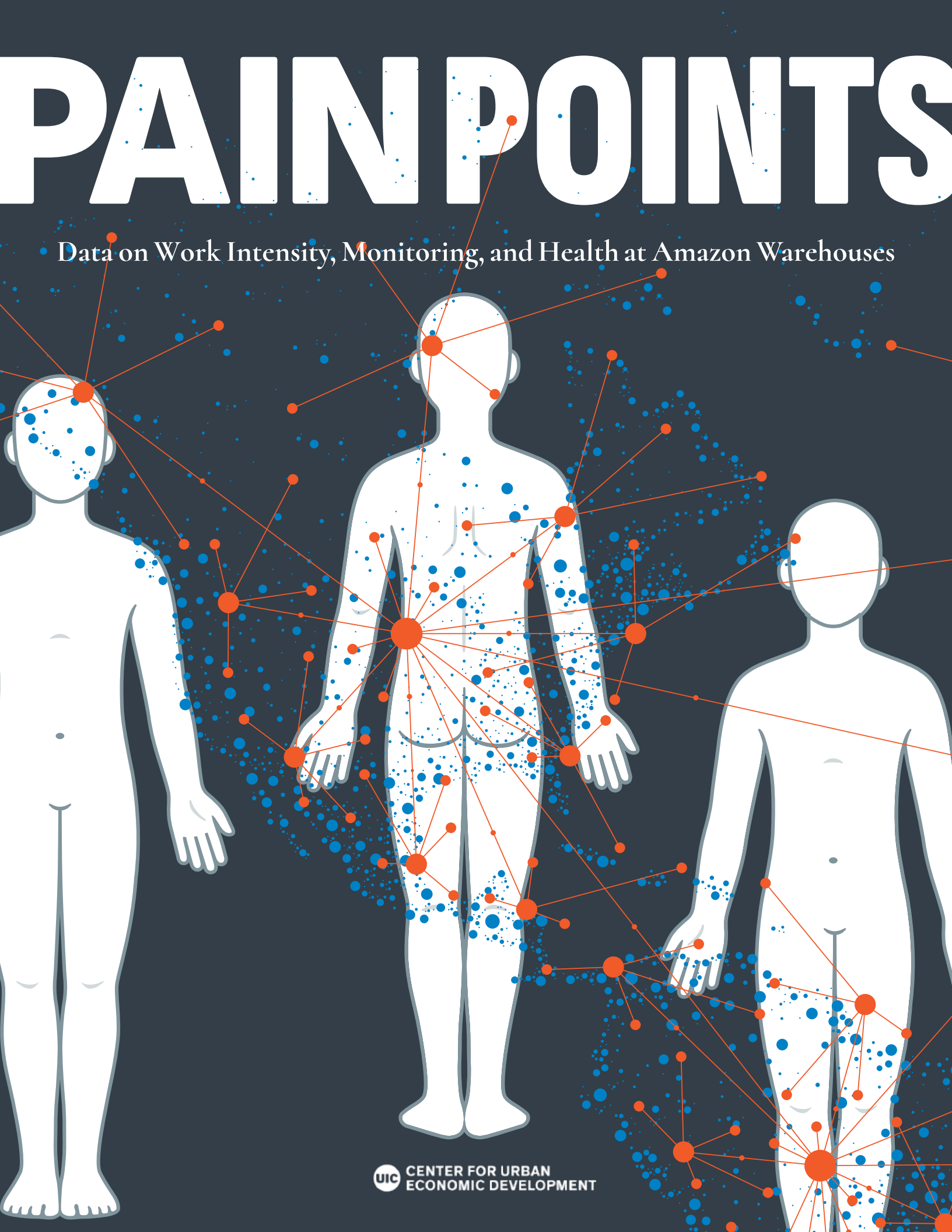
PAIN POINTS

Data on Work Intensity, Monitoring, and Health at Amazon Warehouses



UIC CENTER FOR URBAN ECONOMIC DEVELOPMENT

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Data on Work Intensity,
Monitoring, and Health at
Amazon Warehouses

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Co-Authored by
Beth Gutelius Ph.D. and Sanjay Pinto Ph.D.

UIC CENTER FOR URBAN
ECONOMIC DEVELOPMENT

Table of Contents

The leading online retailer in the United States by some distance, Amazon has also grown to become the country's largest employer of warehouse workers, with a workforce of more than 700,000. Media reports and government investigations have raised concerns about the pace and monitoring of work at Amazon and the safety and health of its workforce. Based on a national survey of 1,484 frontline Amazon warehouse workers across 451 facilities and 42 states, the following are some key findings on these issues:

41% PERCENT OF WORKERS REPORT BEING INJURED while working at an Amazon warehouse; 51% at the company for more than three years have been injured.

69% HAVE HAD TO TAKE UNPAID TIME OFF due to pain or exhaustion from working at the company in the past month; 34% have had to do so three or more times.

52% FEEL BURNED OUT from their work at Amazon. Among those working at the company for more than three years, 60% report feeling burned out.

41% ALWAYS/MOST OF THE TIME FEEL PRESSURE TO WORK FASTER, and another 30% sometimes do.

INJURY (53%) AND BURNOUT (78%) ARE ELEVATED AMONG THOSE FEELING PRESSURE to work faster always/most of the time.

60% EXPERIENCE MORE WORKPLACE MONITORING AT AMAZON than at previous jobs, 9% experience less monitoring, and 17% say the level is about the same.

Together, these findings indicate that a logistics system geared towards unrelenting speed and maximum customer convenience exacts a heavy toll on the health and well-being of many Amazon warehouse workers. In turn, this health toll brings unmeasured economic impacts, given the immediate costs of unpaid time off from work and the potential long-term effects of pain, injury, and burnout on workers' livelihoods. Stronger regulatory guardrails and advances that afford workers greater voice and input could help improve Amazon's working conditions.

Introduction

Over the last decade, the warehousing industry has undergone a series of momentous changes, from the rise of online retail to shifts in competitive strategy linked to the adoption of new technologies. At a time when observers were primarily concerned with the implications of automation for job displacement in the industry, groundbreaking research brought attention to the ways in which new technologies were undermining job quality through deskilling, work intensification, and increases in worker surveillance.[1] The upshot: The robots are here, but to fully appreciate the impacts of new technologies, we need to examine how they are being integrated in relation to working people.

The largest warehouse employer in the U.S., accounting for an estimated 29% of all workers in the industry (see Appendix A), Amazon holds an important place in contemporary debates about the use of new technologies in modern workplaces. The company is a clear industry leader in developing and deploying new forms of performance monitoring and algorithmic management. Amazon executives are eager to tout this technological prowess—including the use of advanced artificial intelligence (AI)[2] —and what it means for consumer convenience.

The implications of these technologies for the safety and well-being of workers have drawn growing scrutiny, however. Over the last five years, numerous investigative reports, first-hand accounts, and leaked company documents that speak to these issues have been published. More recently, several government agencies, including the Occupational Safety and Health Administration (OSHA), the Department of Justice, and the Senate Committee on Health, Education, Labor and Pensions, have launched investigations into health and safety at the company's facilities across the country.

We were motivated to conduct this research to provide a clearer picture of how Amazon's workplace practices impact frontline workers. This report—the first in a series—focuses on work intensity, electronic monitoring, and health and safety at the company's warehouses. We begin by briefly reviewing the existing state of knowledge on these issues. From here, we describe our methodology for surveying 1,484 current Amazon warehouse workers. We then report survey findings that point to connections between work intensity and monitoring and the health and safety of Amazon workers. Finally, we reflect on what the data say about Amazon's model of organizing work and its broader influence.

1 Gutelius, B. & Theodore, N. (2019). The future of warehouse work: Technological change in the U.S. logistics industry. Berkeley, CA: UC Berkeley Labor Center.

2 Peters, J. (2023, August 3). 'Every single' Amazon team is working on generative AI, says CEO. The Verge. Retrieved from https://www.theverge.com/2023/8/3/23819442/amazon-generative-ai-ceo

Long considered the quiet, perhaps dull cousin of the supply-chain family, the "warehousing and storage" industry is today receiving growing attention. Once conjuring images of goods piled high into stark, vast buildings, long awaiting the moment they would be called forth to re-enter circulation, the rise of online retail and the sudden shocks of the pandemic on global supply chains have positioned the warehousing industry as a site of firms' strategic competitive advantage.

Arguably, no company embodies this shift more than Amazon, which has played a key role in developing the modern "infrastructure of desire"[3]—the company helped cultivate society's appetite for online shopping and free, fast shipping, and then moved to fulfill this new demand with an astounding level of logistics network investment. It is difficult to overstate the role of Amazon in reshaping competitive dynamics in the warehousing industry. In a decade-plus of interviews with the company's logistics competitors, nearly every conversation invariably turns to the "Amazon effect" and how it has impacted operations or labor strategy.[4] Other research underscores Amazon's outsize role both in the industry and in the larger economy,[5] from transforming the landscape of brick-and-mortar retail to becoming a major player in online entertainment services.

While Amazon's rise has been meteoric, the warehousing industry as a whole has also expanded rapidly in recent years. After decades of gradual growth, warehousing employment has soared since 2013, coinciding with the emergence and double-digit year-over-year growth of online retail sales. The industry currently employs nearly 2 million workers. In the face of a sharp increase in the demand for workers, classic economic models would predict a concomitant rise in wages. However, labor-cost containment and other features of this highly competitive, low-margin industry have instead yielded long-term wage stagnation (see chart on next page).[6] Despite making nominal gains during the pandemic, inflation-adjusted wages for warehouse workers are lower in 2023 than in 1990.

Literally and figuratively, warehouses have come to occupy the place factories once did as drivers of employment and economic growth. In the wake of manufacturing firms moving offshore—and taking millions of jobs with them—the warehousing industry expanded, since firms still needed their products accessible to end users in the U.S. Warehouse jobs replaced factory jobs, though

3 De Lara, J.D. (2018). *Inland shift: Race, space, and capital in Southern California* (1st ed.). University of California Press.

4 Gutelius, B. & Theodore, N. (2019). The future of warehouse work: Technological change in the U.S. logistics industry. Berkeley, CA: UC Berkeley Labor Center.

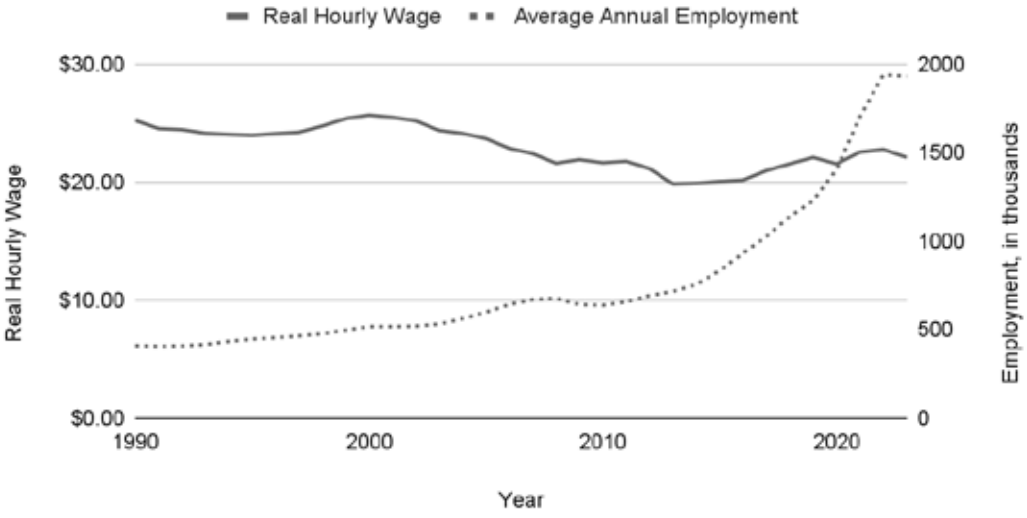
5 Vallas, S. P., Johnston, H., & Mommadova, Y. (2022). Prime suspect: Mechanisms of labor control at Amazon's warehouses. *Work and Occupations, 49*(4), 421–456; Alimahomed-Wilson, J., Allison, J., & Reese, E. (2020). Introduction: Amazon capitalism. In J. Alimahomed-Wilson & E. Reese (Eds.), *The cost of free shipping: Amazon in the global economy* (pp. 1–20). Pluto Press; Delfanti, A. (2021). *The Warehouse: Workers and Robots at Amazon.* Pluto Press.

6 Litwin, A. S., Hammerling, J. H., Carré, F., Tilly, C., Benner, C., Mason, S., Viscelli, S., Gutelius, B., & Theodore, N. (2022). A forum on emerging technologies. *ILR Review*, 75(4), 807–856.

with fewer unionized workplaces and lower wages. Capturing the similarities between factories and warehouses, commentators often refer to warehouses as "plants"—both tend to be highly engineered, routinized workplaces in which employers are keen to track worker productivity.

Employment and Real Hourly Wages in Warehousing, 1990-2023

Source: Bureau of Labor Statistics Current Employment Statistics



A key tool for setting productivity quotas is engineered labor standards, which are based on time-and-motion studies of workers as they complete tasks. Pioneered by Frederick Taylor, engineered labor standards won popularity in factories dating back to the early 1900s. In modern warehouses, productivity metrics are typically tracked by the barcode scanners workers use to scan goods or packages as they prepare orders—data that can then be compiled across the workforce. In some cases, companies have opted to measure and compare workers' performance in a controversial management practice referred to as "stack ranking."[7] Outside of barcode scanners, adoption of warehouse technologies has been uneven and relatively slow, but some warehouse operators have invested significantly. Amazon has long been on the leading edge of acquiring, developing, and deploying new forms of software and hardware in its facilities, a trend which has spurred other warehouse operators to follow suit. In the realm of individual worker-tracking techniques, Amazon has reached an unquestioned position as the industry leader.

Much of the literature on technological change in the workplace suggests that adopting new technologies can improve the quality of jobs. In the warehousing industry, that could entail alleviating the most strenuous or repetitive tasks in what remains a largely manual-labor industry. For example, autonomous mobile

7 The practice of stack ranking dates back to 20th century industrial management theory and has been abandoned by many firms due to evidence of its detrimental impacts on worker morale. See, for example, Moon, S. H., Scullen, S. E., & Latham, G. P. (2016). Precarious curve ahead: The effects of forced distribution rating systems on job performance. *Human Resource Management Review, 26*(2), 166-179; Ovide, S., & Feintzeig, R. (2013). Microsoft abandons 'stack ranking' of employees. The Wall Street Journal.

robots can reduce the amount of walking that is required, and software systems can improve efficiency and reallocate human labor toward more constructive tasks. But research has also found that potential improvements in job quality will likely be coupled with increases in the pace of work, deskilling, and worker surveillance, which have the potential to create new health and safety hazards and could lead to a net deterioration of working conditions.[8]

AMAZON'S WORK PROCESSES

Amazon organizes its work processes differently depending on the role of the facility, which includes fulfillment centers, sortation centers, delivery stations, cross-docks, customer returns centers, and a few other categories. The majority of workers in Amazon facilities work in fulfillment centers (see Appendix A), where "rate," "takt time," and "idle time" figure prominently in their daily routines. Rate is the number of tasks or items a worker is expected to complete per hour, which varies based on a worker's role. Takt time is the average time between scans with the barcode scanner, which measures the time, in seconds, it takes a worker to make a single transaction. Idle time (formerly known as time-off-task) measures the amount of time a worker is not scanning items while on the clock.

Warehousing counts among industries with high rates of workplace injury. At 5.5 per 100 workers, the annual injury rate in warehousing is higher than that of construction, coal mining, and most manufacturing industries and is more than double the 2.7 per 100 average for all industries.[9] Despite the introduction of new technologies, much of the work that occurs in warehouses involves manual labor. Four of the largest occupations in the industry typically involve low levels of mechanical equipment, and, outside of forklift operators, workers still spend much of the day on their feet, lifting, twisting, and bending in order to move goods. Injuries, then, are often due to overexertion and repetitive motion; slips, trips, and falls; and being hit by objects such as boxes. Injury risks in warehouses can also be exacerbated by inadequate recovery time and the inability of workers to take breaks when they need to rest, as exhaustion and fatigue have been proven to lead to higher rates of injury.[10]

8 Gutelius, B. & Theodore, N. (2019). The future of warehouse work: Technological change in the U.S. logistics industry. Berkeley, CA: UC Berkeley Labor Center.

9 Bureau of Labor Statistics, U.S. Department of Labor. "Industries at a Glance, Warehousing and Storage: NAICS 493." Retrieved from https://www.bls.gov/iag/tgs/iag493.htm; https://www.bls.gov/iif/

10 Occupational Safety and Health Administration, U.S. Department of Labor. "Long Work Hours, Extended or Irregular Shifts, and Worker Fatigue." Retrieved from https://www.osha.gov/worker-fatigue/hazards

Repetitive motion and other job-related stresses and strains can lead to musculoskeletal disorders (MSDs), which are "among the most disabling and costly conditions in the United States,"[11] with far-reaching and long-term impacts. Because repetitive motion injuries are often cumulative and can be slow to emerge, a worker may not immediately identify their carpal tunnel or joint pain as an outgrowth of their employment. For this reason, many such cases are less likely to be captured in workplace injury statistics.

Some warehouses have higher rates of injury than others—Amazon's self-reported injury rate in 2022 was 6.7 per 100 workers[12] and, according to one analysis, Amazon's rate of "serious injury" (resulting in days away from work or job restrictions) was more than twice that of other warehouse employers.[13] The comparatively high rate of worker injuries at Amazon caught the attention of OSHA, which has launched investigations of several facilities.[14] OSHA has cited safety hazards, levied fines, and issued hazard alert letters that raised questions about the ways in which Amazon reports injuries. Federal OSHA and the Washington State Department of Labor and Industries both cited Amazon warehouses with multiple "willful" violations after finding that Amazon workers are exposed to known ergonomic risk factors that are likely to cause MSDs across many different job roles.[15] The Washington State citation went on to say that workers are "expected to maintain a very high pace of work [...] without adequate recovery time to reduce the risk of MSDs. There is a direct connection between Amazon's employee monitoring and discipline systems and workplace musculoskeletal disorders."[16]

Further, media accounts and OSHA investigations alike have raised concerns about the types of care and advice workers receive at AmCare, Amazon's in-house first-aid clinics.[17] Allegations include, among other issues, that workers

11 National Academies of Sciences, Engineering, and Medicine.(2020, April 21). Selected Health Conditions and Likelihood of Improvement with Treatment: Musculoskeletal Disorders. Washington (DC): National Academies Press. Retrieved from https://www.ncbi.nlm.nih.gov/books/NBK559512/

12 Amazon (2022). Delivered with care. Retrieved from https://cdn-safety.aboutamazon.com/ea/c3/d72d03394d0db22e336048031ec8/amazon-safety-report-2022-v41.pdf

13 Strategic Organizing Center (2023). In denial: Amazon's continuing failure to fix its injury crisis. Retrieved from https://thesoc.org/wp-content/uploads/2023/04/SOC_In-Denial_Amazon-Injury-Report-April-2023.pdf).

14 Amazon operates multiple types of facilities, including fulfillment centers, sortation centers, delivery stations, cross-docks, and customer returns centers. Fulfillment centers are the largest warehouses, where orders are picked, packed, and shipped. Sortation centers receive these packages, sort and load them on trucks for distribution. At delivery stations, packages are divided into shipments for individual customers.

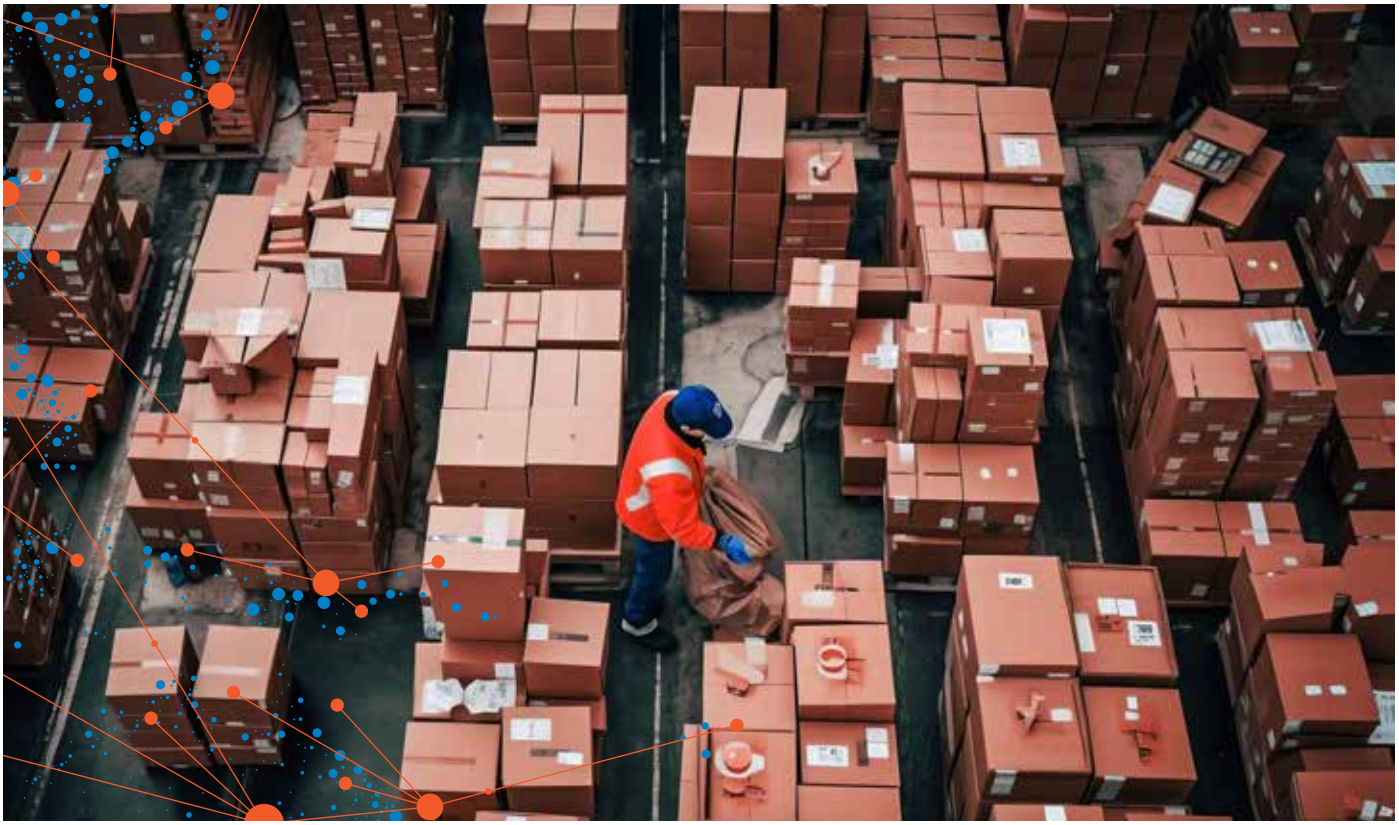
15 Southern District of New York, U.S. Attorney's Office. (2023, January 18). Amazon cited by OSHA based on SDNY referrals for serious violations that exposed workers to safety hazards. Retrieved from https://www.justice.gov/usao-sdny/pr/amazon-cited-osha-based-sdny-referrals-serious-violations-exposed-workers-safety

16 Division of Occupational Safety and Health, Washington State Department of Labor & Industries. (2021, May 4). Inspection 317961850: Citation and notice of assessment.

17 Harrington, C. (2023, August 16). How Amazon's in-house first-aid clinics push injured employees to keep working. *Wired*. Available at: https://www.wired.com/story/amazons-first-aid-clinics-push-injured-employees-to-keep-working/

regularly are urged to return to work despite pain or injury, that AmCare staff have failed to give referrals to outside medical providers, and that AmCare plays a role in under-reporting injuries.[18]

The question of how work pacing and new forms of workplace monitoring are linked with health and safety is complex. A recent study examining OSHA Injury Tracking Application (ITA) data found, somewhat counterintuitively, that Amazon worker injury rates are higher in facilities with more robotics.[19] More specifically, facilities with more robotics are associated with a decline in the traumatic injury rate, but an increase in the non-traumatic injury rate. In examining monthly injury data, the study found higher rates of sprains and strains during high-volume periods (e.g., Amazon Prime Day)—a pattern the authors attribute to "a simultaneous decline in task variety and increase in the pace of work."[20] Below, we present evidence on how work intensity and monitoring are connected to the physical and mental health challenges reported by many Amazon warehouse workers.



18 Occupational Safety and Health Administration, U.S. Department of Labor. (2023, April 18). Inspection 1610874: Citation and notification of penalty. Retrieved from https://www.dol.gov/sites/dolgov/files/OPA/newsreleases/2023/04/23-785-NAT.Amazon Citations%2C042623.pdf

19 Burtch, G., Greenwood, B., & Ravindran, K. (2023). Lucy and the Chocolate Factory: Warehouse robotics and worker Safety. George Mason University School of Business Research Paper. Retrieved from https://ssrn.com/abstract=4389032.

20 *Ibid.*, p. 24

The National Survey of Amazon Warehouse Workers recruited current frontline warehouse workers from across the United States to complete a 98-question survey covering a range of topics including employment and personal background, work intensity and worker monitoring, health and safety, workplace fairness, worker voice and input, and economic security. The survey was fielded between April and August of 2023.

The survey protocol was approved by the University of Illinois Chicago (UIC) Institutional Review Board, and participants filled out the survey on the Qualtrics platform, a survey fielding program, using their computers or smartphones. As an incentive, participants were offered a chance to win one of fifteen $175 gift cards. We engaged a media firm to assist us in advertising the survey. Participants were recruited into the survey using the Meta/Facebook targeting method refined by Schneider and Harknett (2022),[21] which has been established as a proven method for reaching a relatively wide sample of workers at specific employers in the absence of direct access to lists of employees. Following Harknett and Schneider, we ran advertisements to individuals who listed Amazon as their employer. Recognizing that not all Amazon workers would list the company as their employer on Meta, and that there may be demographic biases in who chose to do so, the media firm also advised us in developing a strategy for running specific advertisements in geographic areas where Amazon facilities were located or where large numbers of Amazon workers likely resided.

We implemented several measures to help ensure data quality. A "CAPTCHA" at the beginning of the survey helped to filter out potential bots. Amazon assigns alphanumeric codes for its warehouse facilities, and we also included a question asking respondents to identify the code of the primary facility in which they worked. In the question prompt, we included a fake code, and survey responses in which this code was entered or in which other open-ended responses provided indications of fraud were discarded. We used query strings generated within Qualtrics to track how different targeting "campaigns" were performing—for example, targeting by employer keyword versus "geofencing" around facilities based on employment size or in specific geographic areas. Early on in the data collection process, we were able to use the information from these query strings to identify and eliminate a cluster of surveys showing a pattern consistent with fraud.

21 Schneider, D., & Harknett, K. (2022). What's to like? Facebook as a tool for survey data collection. *Sociological Methods & Research, 51*(1), 108–140.

In order to be eligible for the full survey, participants had to be over the age of 18, residents of the United States, and currently employed at an Amazon warehouse facility. In all, 3,700 people came into the survey, including 2,605 current workers, 466 former workers, and 629 individuals who said that they had never worked at the company. Individuals who said they had never worked at Amazon were immediately screened out and former workers were screened out after responding to a short set of questions. Of those who identified as current workers, 2,369 were frontline warehouse workers, including 2,127 who placed themselves in the "Warehouse associate (Tier 1)" category, and 242 who identified themselves in the "Process assistant/process guide (Tier 3)" category. Respondents identifying as managers or drivers were screened out of the survey.

For our purposes, completed surveys were those in which respondents reached the gender, ethnicity, and race questions situated at the midpoint of the survey instrument. 1,558 survey participants reached this point in the survey. We reweight survey responses using demographic information on the Amazon workforce as reported by the company to the EEOC in 2021 (see Appendix B for more information on how these weights were constructed). Respondents who preferred not to identify their ethnicity, gender, or race were dropped from this weighting variable. Unfortunately, although the EEOC recently announced that it would begin incorporating a "non-binary" category in its gender reporting, this change was not yet in effect in 2021. As a result, non-binary individuals also had to be dropped from the weighting variable. In all, 1,484 individuals provided sufficient information to be included in the weighting variable.

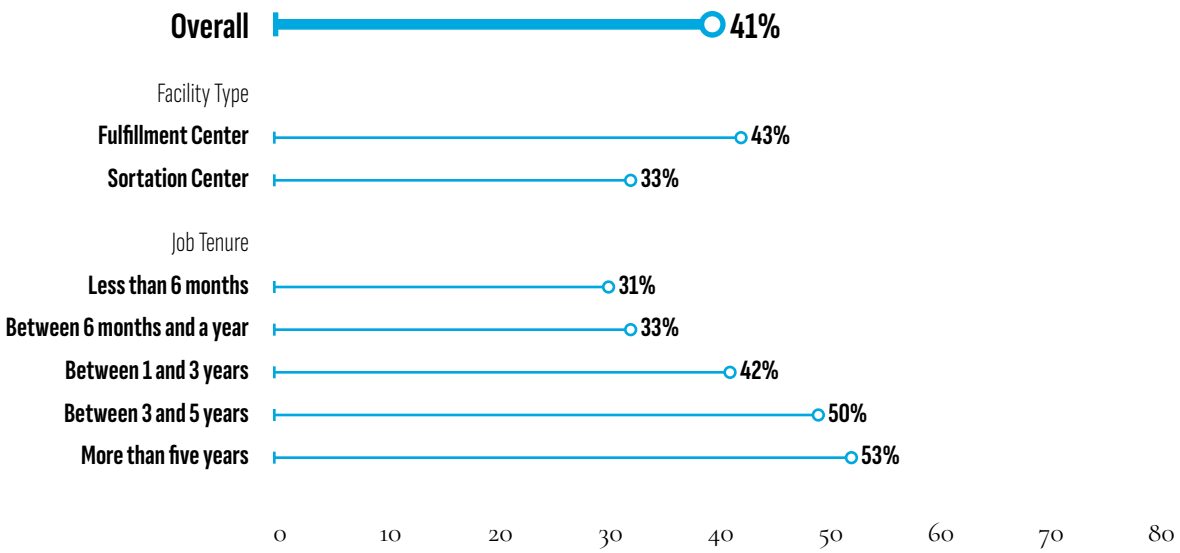
In the findings section below, we report the results of weighted analysis since this allows us to account for skews in the gender, ethnic, and racial composition of the survey sample, presenting a more representative picture of the frontline Amazon workforce. In instances where we show variation by demographic or employment-related variables, all differences that we report are statistically significant at a 95% confidence level based on the results of weighted logistic regression analysis.

The National Survey of Amazon Warehouse Workers captured a broad swath of Amazon's frontline warehouse workforce. The dataset represents workers from 42 states and 451 facilities, including fulfillment centers, delivery stations, sortation centers, and a variety of other types of facilities. Thirty percent of respondents had worked for the company for a year or less, 60% for one to five years, and 10% for five years or more. More information on the demographic composition of the sample is included in Appendix C.

HEALTH AND SAFETY

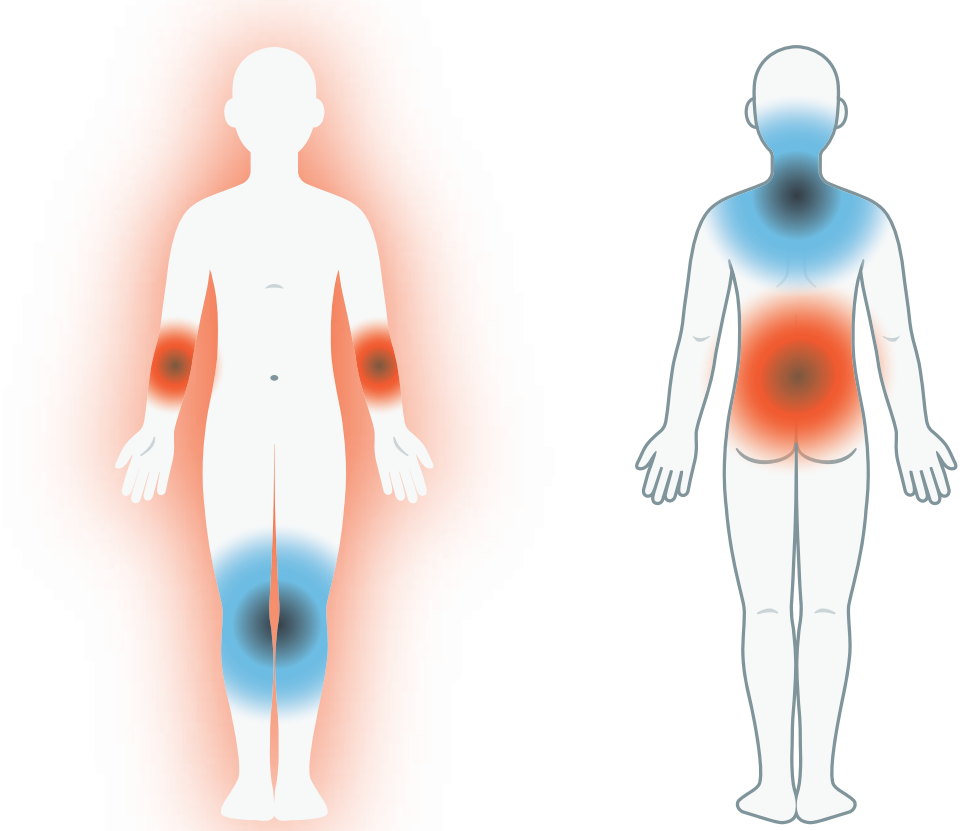
Forty-one percent of workers report having been injured on the job while at Amazon. That more than 4 in 10 workers report they have been injured—32% within their first year of work alone—is an important measure of workers' own assessment of injury (see Figure 1). The statistic can be thought of as a reflection of the rate at which Amazon workers have found themselves not returning home in the same condition as when they left. While this figure cannot be compared one-to-one with the injury and illness data Amazon reports to OSHA, our findings on the kinds of injuries people have suffered indicates that many would likely fit within OSHA injury categories (see Sidebar on page 17). Among those reporting injuries, 61% specify that their most recent type of injury was a "sprain, strain, or tear"; 27%, a "contusion or bruise"; 20%, a "cut or laceration"; 5%, a "fracture"; and 16%, another type of injury not listed (respondents were able to select more than one answer).

FIGURE 1 **Share of Workers Who Report Being Injured on the Job at Amazon**



The physical health impacts extend beyond acute injuries. Amazon workers report pain across different areas of the body (see Figure 2). These pain points are most pronounced in the lower extremities, with nearly half (49%) of workers reporting moderate or severe pain in the "leg, knee or foot" in the last three months due to their work at Amazon (including 52% at fulfillment centers and 33% at sortation centers). Forty-nine percent have experienced moderate or severe "physical exhaustion" (including 53% at fulfillment centers and 30% at sortation centers). Overall, 40% of Amazon warehouse workers report that working at the company has had a "negative impact on [their] physical health," 25% say it has had a "positive impact," and 35% report "no impact."

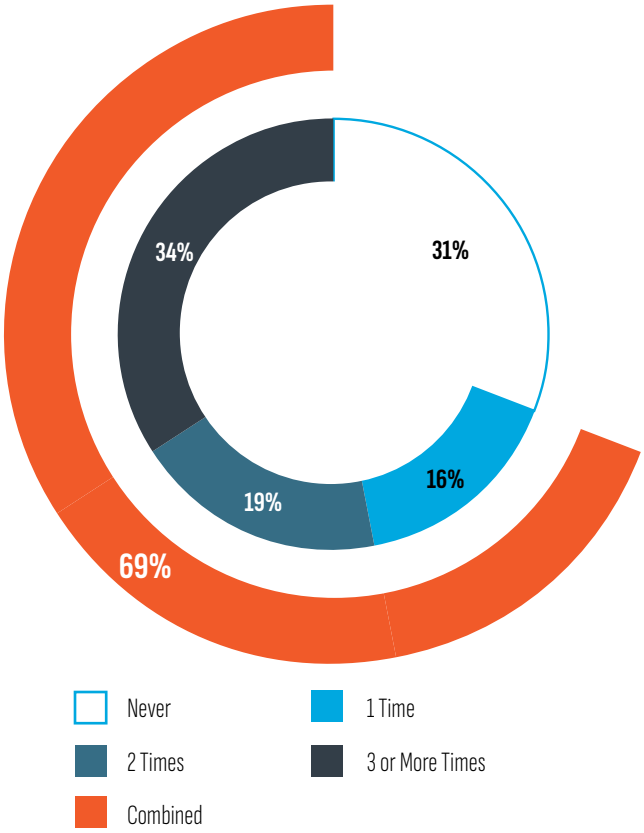
FIGURE 2 **Incidence of Pain and Exhaustion Resulting From Work at Amazon**



BODY REGION	None	Mild	Moderate	Severe
LEG, KNEE, OR FOOT PAIN	21%	30%	31%	18%
PHYSICAL EXHAUSTION	22%	29%	31%	18%
BACK PAIN/ACHING	23%	34%	30%	13%
SHOULDER OF NECK PAIN/ACHING	32%	31%	26%	11%
HAND, WRIST, OR ARM PAIN	32%	32%	25%	11%

The toll on physical health is apparent across different segments of Amazon's frontline warehouse workforce, albeit with some notable variation. For example, the overall injury rate for workers at fulfillment centers (43%) is higher than it is for workers at sortation centers (33%). Perhaps most striking is how the physical health toll worsens over time. Over half (51%) of workers who have been at the company for more than three years report injury (see Figure 1). The share of those reporting negative physical health impacts also increases with longer tenure at the company (45% for those employed by Amazon for more than three years versus 29% for those working at the company for less than a year).

FIGURE 3 **Number of Times in the Past Month Having Taken Unpaid Time Off Due to Pain or Exhaustion From Working at Amazon**

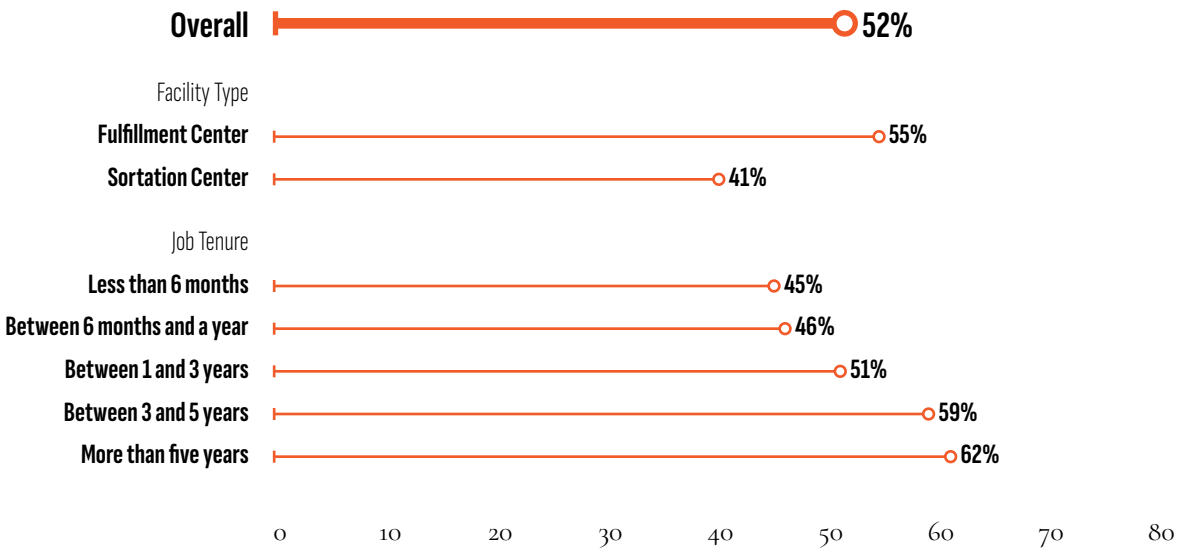


A significant majority of workers—69%—report that, in the last month, they had to take "unpaid time off (UPT or VTO [voluntary time off]) from working at Amazon because of pain or exhaustion resulting from [their] work." Thirty-four percent have had to do so three or more times (see Figure 3)—a figure that jumps to 43% among those who say they have trouble taking breaks when they need them. Among those reporting a negative overall impact of working at the company on their physical health, 84% have had to take unpaid time off due to pain or injury from their work at the company over the past month, pointing to one potential economic impact of these health-related concerns. Also worth noting in this context is that, among 307 former Amazon warehouse workers who quit their jobs at the company, 12% said the main reason they left was due to injury or ill health stemming from their work at the company. Another 18% identified the workload or pace of work as their main reason for leaving—issues we discuss below.

In addition to substantial rates of injury and physical pain from working at Amazon warehouses, our data also reveal a significant toll on workers' mental health, which has received less attention from observers to date. Fifty-two percent of Amazon warehouse workers report that they "feel burned out from [their] work at Amazon." Thirty-five percent report that working at the company has a "negative impact on [their] mental health," 18% say it has a positive impact, and 48% report no impact. Here, again, the toll builds over time. Burnout intensifies with longer tenure (see Figure 4), as does the proportion of those reporting negative overall impacts on their mental health (40% for those with more than three years at Amazon, versus 27% for those there under a year).

Interestingly, most Amazon warehouse workers (64%) say that "the safety of workers is a high priority" at the company. However, clear fault lines emerge. Just 38% of those reporting a negative physical health impact from working at Amazon say the company prioritizes safety, as opposed to 80% of those reporting a positive impact or no impact. Likewise, 35% of those reporting a negative mental health impact say the company prioritizes safety, versus 79% reporting a positive impact or no impact. For those who experience adverse health impacts, views on how the company prioritizes safety are markedly less favorable.

FIGURE 4 **Share of Workers Who Report Being Burned Out From Their Work at Amazon**



Why Are the Injury Rates in This Data So Much Higher Than the Injury Rates in OSHA's Data?

What accounts for the yawning gap between what the survey data say about injuries at Amazon and the rate calculated with OSHA ITA data supplied by the company? First, of course, it is important to make sure as much as possible that we are comparing "apples to apples." Since the rates that OSHA publishes are annual (6.7% in 2022 according to Amazon), it makes the most sense to compare this rate to the one we found for workers who have been at the company for a year or less (31.6%). The survey categories we used to collect information on the types of injuries people have experienced were formulated based on OSHA categories, and the responses (see Figure 3) indicate that most would fit within these definitions. Though we do not have enough detail in our data to know exactly which of these cases would qualify as recordable injuries under OSHA guidelines, it is unlikely that definitional differences would account for all or most of the gap between our figure and the one based on Amazon's self-reported data.

Reporting itself is another potential factor in the discrepancy. Among injured Amazon workers indicating actions they took afterward, just 3% say they reported the injury directly to OSHA or a state agency. Meanwhile, 64% say they reported the injury to a supervisor or the company. Some of these incidents will undoubtedly make their way into the injury data that Amazon provides to OSHA for the relevant reporting period, but it seems plausible that a substantial proportion could fall through the cracks and not be accounted for in the official figure. In other words, a failure to report externally incidents that get reported by workers internally could lead to an overall undercount of injuries in official records. Our findings on unpaid time off may also be relevant in this context. According to OSHA guidelines, an occupational injury is recordable if, among other things, it results in lost workdays. Thus, the fact that 69% of workers took unpaid time off in the last month due to pain or exhaustion raises general questions about whether there are injuries resulting in lost work time that are not being recorded in line with OSHA rules.[22]

Non-reporting by workers—a well-established health and safety problem—could also deflate Amazon's injury numbers.[23] Among the roughly one-third of workers who say they did not report their injury at all, responses to a select-all question on the reasons why show that 25% say they were "concerned [they would] face negative consequences," 23% "didn't think [they] would get help for [their] injury," and 9% "didn't want to ruin [their or their team's] clean safety

22 A worker who reports a work-related injury to their employer should receive information about filing a workers' compensation claim. Among Amazon workers who report being injured on the job, just nineteen percent "filed a workers compensation claim." In response to a select-all-that-apply question on the outcomes of these claims, 66% say their claim was "approved" and 30% received "temporary disability support," while 17% say their claim was "denied" and another 11% say their claim is still "pending."

23 See, for example, Pransky, G., Snyder, T., Dembe, A., & Himmelstein, J. (1999). Under-reporting of work-related disorders in the workplace: a case study and review of the literature. *Ergonomics, 42*(1), 171-182.

record"—concerns that could certainly contribute to underreporting of injuries that should be officially logged.[24] Fifty-three percent of those not reporting their injury say "[i]t was not a serious injury." Recall, however, that many repetitive motion injuries are cumulative in nature, worsening gradually over time. A segment of these self-identified "non-serious" injuries may be ones that should, in fact, be reported and acted upon to prevent more serious health outcomes, such as musculoskeletal disorders, in the future.

AmCare first-aid clinics could also play a role in underreporting, according to our data. Over half of those reporting injuries (58%) say they went to AmCare, and those receiving treatment from AmCare report varying experiences (26% say it was "excellent"; 27% "good"; 28% "fair"; and 18% "poor"). When asked about outcomes of going to AmCare, 22% report being "discouraged from seeing a doctor outside of AmCare," 12% say "AmCare delayed [their] request for treatment," 12% say they "couldn't get treated," and 3% say "AmCare denied [their] request for treatment." In line with previous media reporting and findings by OSHA's inspectors and physicians, these data suggest that AmCare staff, operating without formal supervision by licensed health care providers, may be erecting barriers for workers to receive the threshold "medical treatment" that would otherwise require the company to record an injury.[25]

Among respondents in general within our sample, three-quarters (75%) say they "feel free to report health and safety concerns or violations." This figure is lower for injured workers (67%) than for those who have not been injured (81%), and substantially lower for those reporting a negative overall physical health impact from working at Amazon (61%) versus those reporting a positive impact or no impact at all (85%). This question does not speak directly to the issue of reporting one's own injury. However, these patterns suggest that those with the greatest stake in being able to report health and safety concerns are less likely to feel free doing so.

So what does all of this mean for comparing our injury data with what Amazon reports itself? The information we have does not support being able to say exactly how many of the injuries respondents report in our data *should* be counted under OSHA's guidelines. But the totality of the evidence we have been able to compile suggests that the reporting system is not capturing the full scope of injuries occurring in Amazon warehouse facilities.

24 Note that the sample size for some of the analysis in this sidebar is fairly limited, involving smaller subsets of workers who have responded on why they did not report their injury (n=179) and their experience with Amcare (n=413).

25 Harrington, C. (2023, August 16). How Amazon's in-house first-aid clinics push injured employees to keep working. Wired. Retrieved from https://www.wired.com/story/amazons-first-aid-clinics-push-injured-employees-to-keep-working/

WORK INTENSITY AND WORKPLACE MONITORING

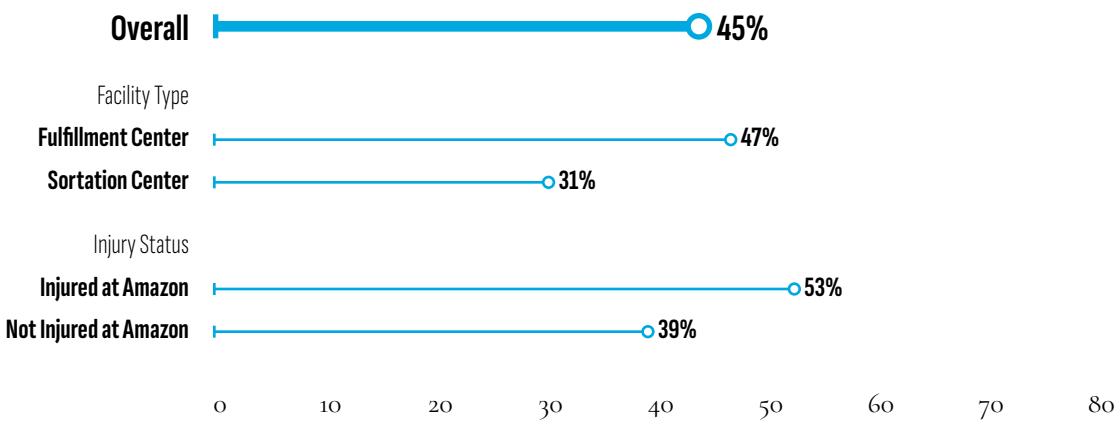
Amazon has received widespread attention related to the productivity targets it sets for its workforce, which often entail using a handheld scanner that tracks the amount of time a worker takes to complete a task or take a break. Our data show that a significant share of Amazon warehouse workers report challenges reaching these quotas, with 45% saying that "keeping up with Amazon's pace of work/making rate is hard." Workers at fulfillment centers are more likely to report trouble keeping up (47%) than workers at sortation centers (31%)—a difference that echoes worker accounts suggesting that the pace of work and level of monitoring in fulfillment centers are higher than other facilities.[26] Those reporting that they have been injured on the job while working at Amazon are also more likely to say that keeping up is hard (53%) than workers who have not been injured (39%) (see Figure 5).

Challenges related to work pacing and intensity are also reflected in the large share of workers who find it difficult to pause their work when they need to. While 49% say they "are able to take breaks when [they] need to," 44% say they cannot. Meanwhile, 23% report that their "production standard or rate makes it hard for [them] to take time to use the bathroom "always/most of the time," and another 31% say it sometimes does. These statistics point to one set of channels through which high productivity demands could impact health and safety: A key mechanism for workers to maintain a fast pace of work without injury is the ability to take breaks and recover from periods of intense work,[27] and yet a notable segment of Amazon's workforce faces obstacles to resting or relieving themselves when they need to.

26 See, for example, https://www.reddit.com/r/FASCAmazon/comments/rv9v23/sort_center_vs_fulfillment_center/; https://www.reddit.com/r/FASCAmazon/comments/xfvmqb/people_who_have_worked_sortation_center_warehouse/

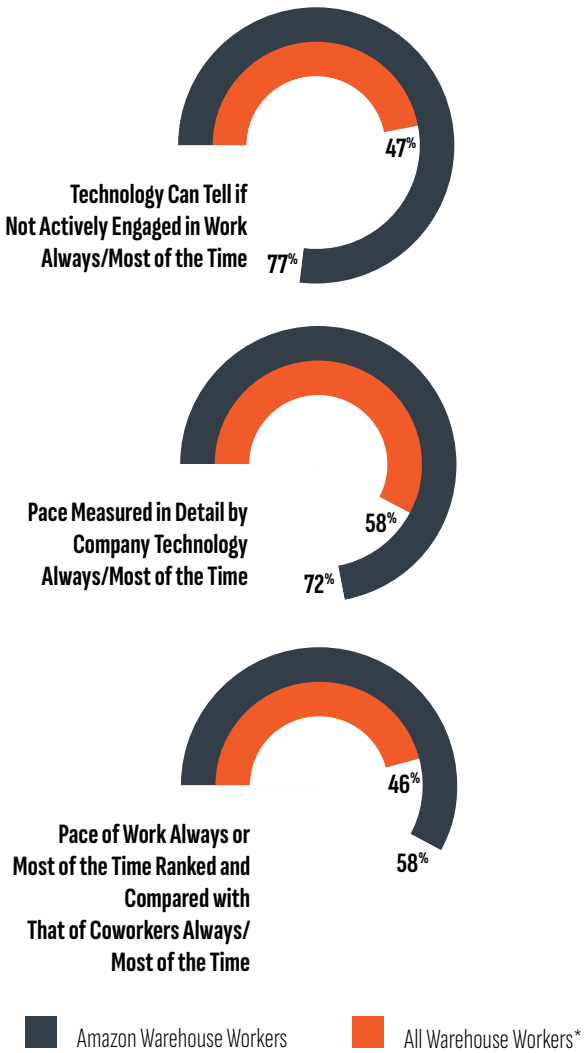
27 Tucker, P. (2003). The impact of rest breaks upon accident risk, fatigue and performance: A review. *Work & Stress, 17*(2), 123-137.

FIGURE 5 **Share of Workers who Say Keeping up with Amazon's Pace of Work/Making Rate is Hard**



Our data indicate strongly that the pace and intensity of work within Amazon warehouses is reinforced by the company's system of technology-enabled workplace monitoring, and that, in this respect, Amazon is an outlier in the industry. Seventy-seven percent of Amazon warehouse workers say "the technology can tell if [they] are not actively engaged in [their] work" almost/most of the time—as compared to just 47% of workers in a recent representative survey of hourly warehouse industry workers in general.[28] Similarly, 72% of Amazon workers report that "how fast [they] work" is always/most of the time "measured in detail by company technology," versus 58% of warehouse workers in general. The data from detailed scans feed into a larger system of monitoring across workers, allowing Amazon to compare a worker's performance against others. Fifty-eight percent say their work pace is always/most of the time "ranked and compared with the pace of [their] coworkers," as opposed to 46% of all warehouse workers (see Figure 6)—an indication that the impacts of stack ranking are more widely felt in Amazon warehouses than those of its competitors. In short, Amazon workers experience productivity monitoring at a higher rate than their peers.

FIGURE 6 **Aspects of Individual Worker Monitoring at Amazon Versus the Warehousing Industry as a Whole**



* *Calculation based on WERN Survey Data*

28 Ahlquist, J.S., Grumbach, J., Kochan, T.,& Bronfrenbrenner, K. (2023). The WERN Workers' Survey: Voice on the job among frontline workers in five industries. To compare our "Always/Most of the Time" category to the WERN data, we aggregated the "Always," "Almost Always," and "Usually" categories from that dataset.

In addition to its centrality in enforcing productivity quotas, Amazon's system of workplace monitoring contributes to a more generalized sense of being watched. Fifty-three percent of Amazon workers say they always or most of the time "feel a sense of being watched or monitored in [their] work" at the company, and 26% say they sometimes do. For most, the monitoring and surveillance they experience at Amazon exceeds what they have encountered in other work environments. Again, the data show that Amazon is an outlier with regard to the extent of workplace monitoring: Sixty percent report that the "level of monitoring or surveillance" is more at Amazon than at past jobs, versus 17% who say it is about the same, and 9% who say it is less.

A plurality of Amazon warehouse workers feel that surveillance and monitoring are used by the company more as a means of controlling workers than supporting them. When asked how the company uses electronic monitoring, 45% say "it's mainly used to control or discipline workers," 36% say "it's mainly used to help develop workers' skills and abilities," 7% say it is used for another reason, and 12% are not sure. This sense of Amazon's workplace monitoring system having a primarily disciplinary function does not ease for those who remain at the company over a substantial period of time: Among those at the company for more than three years, 52% say that monitoring is mainly used to control or discipline workers. Amazon workers receive feedback about their performance from the technology at their workstations, from managers, and via a network of cameras placed throughout facilities,[29] reinforcing the feeling that technology is being used as a mechanism of constant oversight and a means of compelling workers to move faster.

HOW ARE PACE AND MONITORING LINKED TO HEALTH OUTCOMES?

We see clear evidence in our data that work intensity and monitoring contribute to negative health outcomes. For many, the pace of work induces a sense of pressure and psychosocial stress. Forty-one percent of Amazon workers say they always/most of the time "feel a sense of pressure to work faster," and 34% say they sometimes do. Thirty percent always or most of the time "feel anxious about meeting [their] production standard or rate," and another 31% sometimes do. We also see strong evidence that such feelings are often associated with burnout. Seventy-eight percent of workers who report always/most of the time feeling a sense of pressure to work faster report feeling burned out from their work at Amazon, as opposed to 45% who sometimes feel this sense of pressure, 23% who rarely do, and 15% who never do (see Figure 7). We observe a similar correlation between pressure to work faster and mental health.[30] And, among those reporting

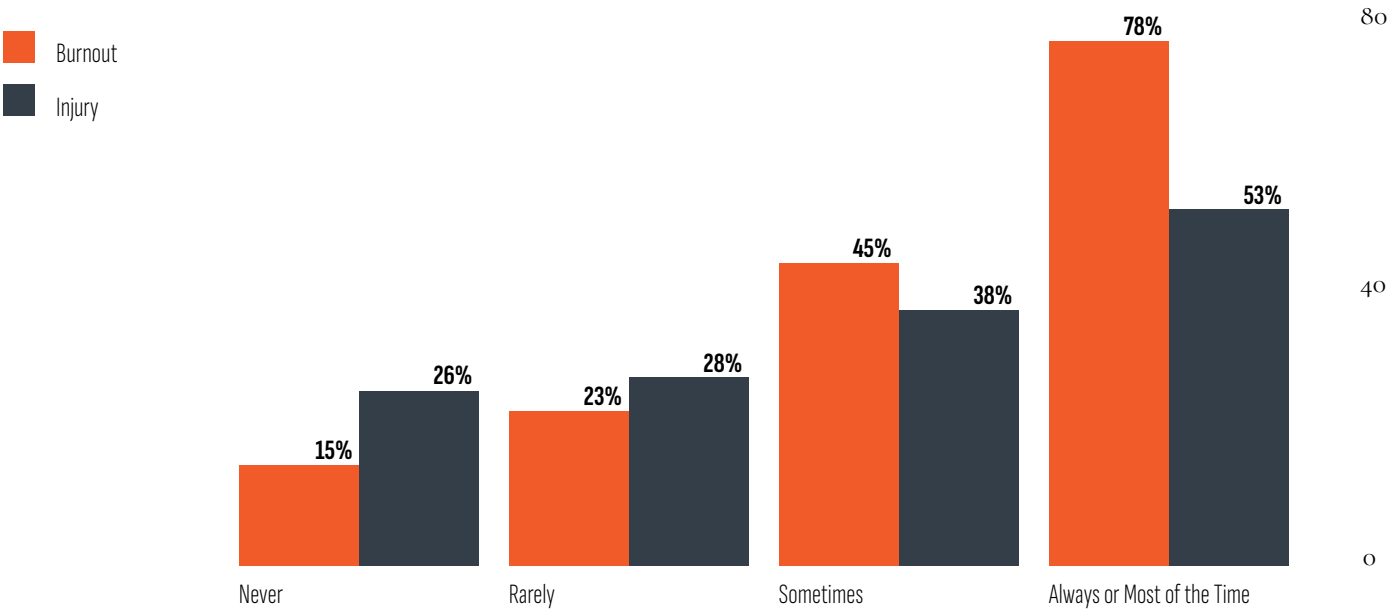
29 Seventy-eight percent of workers have experienced "surveillance or monitoring" by "supervisors"; 65%, by "video cameras"; 46%, by "technology/computers"; 33%, by "security guards"; 22%, by "loss prevention specialists"; and 3%, by "police."

30 Those who feel pressure to work faster always/most of the time are more far more likely to say that working at the company had a negative impact on their mental health (55%) than those who sometimes (24%), rarely (17%), or never do (14%).

that working at Amazon has a negative impact on their mental health, 46% say this negative impact is related to "how Amazon monitors [them or their] performance," 26% say it might be, and 29% say it is not.

Our data also suggest that the pace and monitoring of work contribute to injuries within Amazon warehouses. Sixty-one percent of Amazon warehouse workers say they can "meet [their] performance objective/make rate without risking [their] safety or health." However, those who report trouble taking breaks are more likely to report having been injured (47%) than those who say they can take breaks when needed (36%). Moreover, injury rates, like burnout, are significantly higher among those who report always/most of the time feeling a sense of pressure to work faster (53%) than those who sometimes (38%), rarely (28%), or never (26%) do (see Figure 7)—as are moderate to severe leg pain, exhaustion, and a negative overall physical health impact from working at the company.[31] Among those reporting a negative physical health impact, 40% say "it is related to how Amazon monitors [them or their] performance," 26% say it might be, and 34% say it is not.

FIGURE 7 **Variation in Burnout and Injury Based on Frequency of Feeling Pressure to Work Faster**

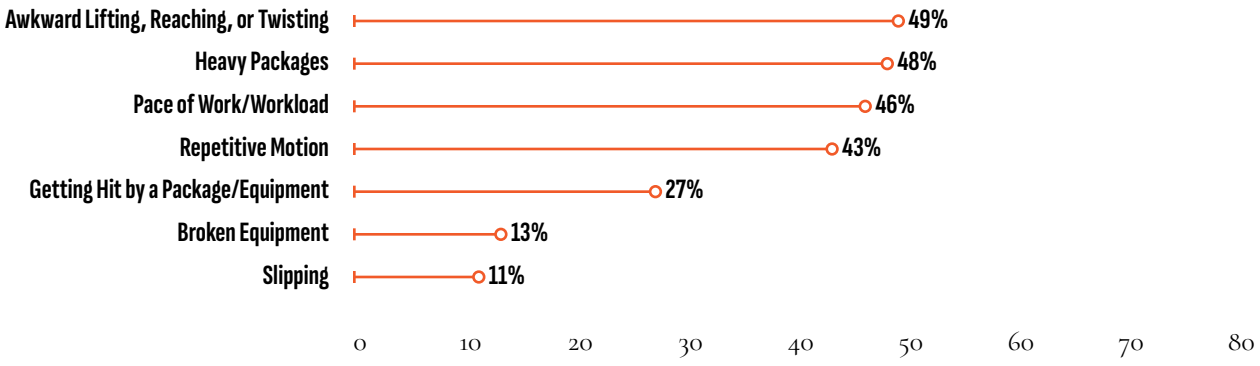


31 Moderate to severe leg pain is significantly more prevalent among those who report always/most of the time feeling a sense of pressure to work faster (66%) than those who sometimes (43%), rarely (36%), or never do (22%). Likewise, moderate to severe exhaustion is significantly more widespread among those who report always/most of the time feeling a sense of pressure to work faster (74%) than those who sometimes (40%), rarely (28%), or never do (15%). And those who feel pressure to work faster always/most of the time are more far more likely to say that working at the company had a negative impact on their physical health (61%) that those who sometimes (32%), rarely (20%), or never do (12%).

While our survey focused particular attention on work pacing and monitoring, the role of these factors in generating pain and injury needs to be understood alongside other aspects of how work is configured within Amazon warehouses, including the physically taxing nature of lifting and loading packages. In a select-all-that-apply question asking respondents to identify factors that contributed to their work-related injuries, 49% note "awkward lifting, reaching, or twisting"; 48%, "heavy packages"; 46%, "pace of work/workload"; 43%, "repetitive motion"; 27%, "getting hit by a package/equipment"; 13%, "broken equipment"; and 11%, "slipping" (see Figure 8).

Some workers are able to meet Amazon's expectations and do so safely, but the data show clearly that a considerable segment of the company's warehouse employees are struggling. We find that Amazon's industry-leading use of robotics, algorithmic management, and monitoring appear to be implemented in ways that not only fail to alleviate injuries common to the industry, but increase pain, injury, and mental health issues among its workforce. These problems are especially pronounced in Amazon's fulfillment centers, where the majority of its workforce is employed, suggesting design flaws that are endemic to the company's core work processes.

FIGURE 8 **Factors Contributing to Injury on the Job at Amazon**



Amazon has used the term "industrial athletes" to describe its frontline warehouse employees,[32] an acknowledgment that the level of physical exertion in its facilities is exceptionally high. The findings of this study indicate that a large share of people laboring in Amazon warehouses are suffering from having worked there, with many reporting pain and injury as well as burnout and other forms of psychosocial stress. While a full accounting of the reasons for these patterns would need to probe a variety of different aspects of work process and job design, our data indicate that the pace and monitoring of work are important factors. Many Amazon warehouse workers struggle to keep up, and those feeling the greatest pressure to work faster are far likelier than others to experience negative health outcomes. Also striking is the fact that an overwhelming majority need to take unpaid time off due to pain or exhaustion as a kind of tacit condition of working at the company. This reduces workers' paychecks in the immediate term. The magnitude of the health toll captured in the data should also raise concerns about potential long-term effects on well-being, medical costs, future employment, and overall economic security.

It is notable that the adverse physical and mental health impacts of working at Amazon warehouses increase over time. This is perhaps less surprising with regard to injuries and physical health, since longer tenure brings added exposure to the risk of accidents or chronic strain. With regard to mental health, however, one might expect a degree of adaptation. The fact that burnout not only affects a majority of Amazon warehouse workers but intensifies over time suggests something essentially unforgiving about the work environment. That a set of increasingly burned-out workers are nonetheless staying on at the company may also indicate the degree to which many workers face limited options in the contemporary U.S. labor market.

A larger question posed by the survey findings is whether the trail being blazed by the second-largest private-sector employer in the country is one we can point to as a model. Amazon has been heralded as a quintessential "innovator," reshaping norms and practices in the warehousing industry and the economy more broadly. But our survey data suggest that its drive towards ever-greater speed and efficiency carries significant costs that are being displaced onto its workforce. Technology can be integrated in ways that relieve stresses and strains and make workers' lives better. However, Amazon is often doing so in a manner that intensifies modes of labor control drawn from a bygone era, creating new forms of tracking, measurement, and "worker quantification"[33] that leave harmful imprints on the bodies and minds of workers in its warehouse facilities.

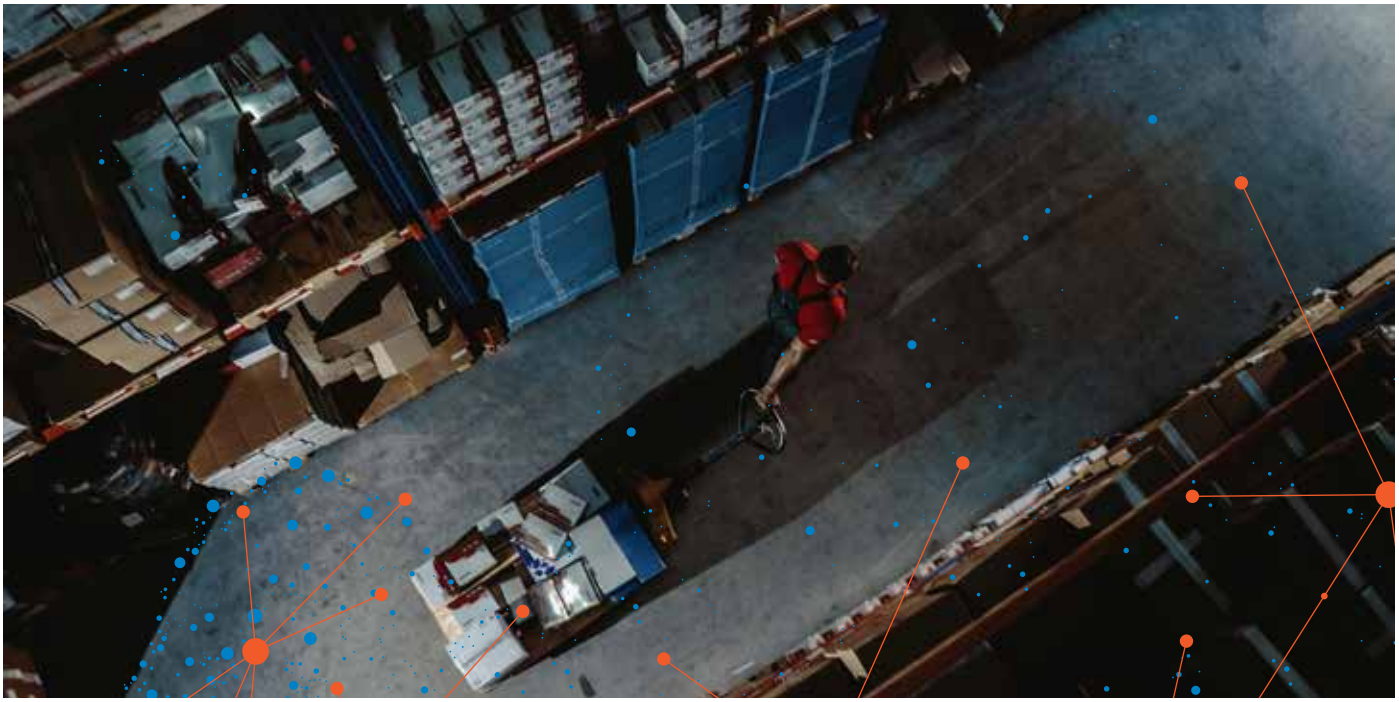
32 Ongweso, Jr., E. (2021, June 1). Amazon Calls Warehouse Workers 'Industrial Athletes' in Leaked Wellness Pamphlet. Vice. Retrieved from https://www.vice.com/en/article/epnvp7/amazon-calls-warehouse-workers-industrial-athletes-in-leaked-wellness-pamphlet

33 Ajunwa, I. (2023). *The quantified worker: Law and technology in the modern workplace*. Cambridge University Press.

Conclusion

With Amazon's workforce turnover rate far exceeding the industry average,[34] it is evident that many workers are simply "voting with their feet." Indeed, they are doing so to such an extent that a leaked internal memo expressed concern that the company could soon exhaust its available pool of workers.[35] The high turnover rate combined with the size of Amazon's workforce mean that a vast number of people have been employed—and many hurt—at the company's warehouse facilities, with impacts that may linger well beyond their time working there.

Company executives consistently state a commitment to health and safety. Perhaps having heard this, workers in general do indicate agreement that the company is prioritizing their safety. However, it is telling that most workers who report that their physical or mental health has deteriorated due to their employment at Amazon do not believe that the company is prioritizing their safety. As the data show, feeling constantly under pressure on the job also correlates strongly with these health outcomes, reflecting elements of work process and job design that flow directly from choices being made by Amazon executives. In the absence of stronger regulatory guardrails and measures that afford workers greater voice and input in shaping company processes, it is difficult to see how a system that is fundamentally injurious to so many workers will change.



34 Kantor, J., Weise, K. & Ashford, G. (2021, June 15). The Amazon that customers don't see. The New York Times. Retrieved from https://www.nytimes.com/interactive/2021/06/15/us/amazon-workers.html; Tung, I., Pinto, M.& Berkowitz, D. (2021). Injuries, dead-end Jobs, and racial inequity in Amazon's Minnesota operations. Retrieved from https://www.nelp.org/publication/injuries-dead-end-jobs-and-racial-inequity-in-amazons-minnesota-operations/

35 Sainato, M. (2022, June 22). Amazon could run out of workers in US in two years, internal memo suggests. The Guardian. Retrieved from https://www.theguardian.com/technology/2022/jun/22/amazon-workers-shortage-leaked-memo-warehouse

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ABOUT CUED

Since 1978, the Center for Urban Economic Development (CUED), a unit of the College of Urban Planning and Public Affairs at the University of Illinois Chicago, has conducted research on a broad range of issues shaping the trajectories of local and regional economies. CUED's mission is to improve development outcomes and expand economic opportunity through research on industrial restructuring, workforce systems, and urban economic change.

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ABOUT THE AUTHORS

BETH GUTELIUS is research director at the Center for Urban Economic Development at UIC and a fellow at the Roosevelt Institute. Her academic and consulting career has focused on economic development, labor markets, and the changing nature of work, specializing in the geography and employment dynamics of supply chain logistics for over a decade. A frequent commentator in major news publications, Gutelius has advised the White House, the National Economic Council, and the U.S. Department of Labor on issues related to the warehousing industry. Recent projects include a major study of third-party outsourcing in logistics funded by the Alfred P. Sloan Foundation. She holds a Ph.D. in urban planning and policy from the University of Illinois Chicago.

SANJAY PINTO is a senior fellow at the Center for Urban Economic Development at UIC and a fellow at the Roosevelt Institute. He also co-directs the program on labor and worker ownership at Rutgers SMLR and is a fellow at the Worker Institute at Cornell ILR. Pinto studies the political economy of work, including labor market institutions across different countries, structures of power and control within contemporary corporations, and efforts to broaden channels of worker voice and input. For the past several years, he has conducted large-scale worker surveys across a variety of industries and geographic settings. Pinto has an M.Sc. in development studies from the London School of Economics and a Ph.D. in sociology and social policy from Harvard University.

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Appendix A: Amazon Share of Warehousing Industry Employment

Amazon's warehouse workforce is spread across two North American Industry Classification System (NAICS) codes: Warehousing and Storage (493110) and Couriers and Express Delivery Services (492110). Using OSHA ITA data from 2022, which provides an establishment-level count of employees, it is possible to estimate Amazon's share of industry employment. We use the data on employment in NAICS 493110 in this report because it accounts for the vast majority of Amazon's warehouse workforce (512,576 workers, versus 204,112 workers in NAICS 492110). Workers in Amazon's fulfillment centers, in turn, make up most of the workforce in facilities classified under NAICS 493110. We estimate that roughly ²/₃ of Amazon's workers are employed in fulfillment centers.

	Establishments	Employment
AMAZON FACILITIES LISTED UNDER NAICS 493110	**348**	**512,576**
ALL FACILITIES LISTED UNDER NAICS 493110	**6,310**	**1,782,456**
AMAZON SHARE OF INDUSTRY EMPLOYMENT		**29%**

Appendix B: Survey Weighting

In order to develop weights for our dataset, we relied on data on the racial/ethnic and gender composition of Amazon's workforce that were reported to the Equal Opportunity Employment Commission (EEOC).[36] The table below shows the gender x race/ethnicity breakdowns of the Amazon warehouse workforce a) according to 2021 data submitted by Amazon to the the EEOC,[37] and b) in our survey sample.

	2021 Amazon EEO-1 data (Laborers and Helpers)	National Survey of Amazon Warehouse Workers
Female		
Hispanic/Latino	**28.1%**	**37.0%**
White	**24.7%**	**37.3%**
Black	**34.4%**	**17.6%**
Native Hawaiian and Pacific Islander	**0.6%**	**0.6%**
Asian	**7.5%**	**3.8%**
American Indian/Alaska Native	**1.1%**	**0.7%**
2+ Races	**3.5%**	**3.0%**
Male		
Hispanic/Latino	**25.1%**	**30.9%**
White	**30.7%**	**40.7%**
Black	**29.8%**	**17.0%**
Native Hawaiian and Pacific Islander	**0.6%**	**0.5%**
Asian	**9.2%**	**6.9%**
American Indian/Alaska Native	**1.1%**	**1.0%**
2+ Races	**3.5%**	**3.1%**

Categories that were included in our survey but not in the 2021 EEO-1 data unfortunately had to be dropped from the sample for weighting purposes. To construct the weights in Stata, a "pre-existing" weight (encoded in the variable *preweight*) equal to 1 for all observations was created using the command:

survwgt poststratify preweight, by(race_gender) totvar(group_total) generate(eeo1wt)

This code created weights using a simple process that can be replicated by hand, given that the weights are created to match just one set of totals. Essentially, it found the total number of observations for each *race_gender* group in the sample and divided that by the group totals constructed from the EEO-1 Amazon data, which were then encoded in the variable *group_total*. The reciprocal of this variable then yielded the weighting variable *eeo1wt* that was used in the data analysis.

36 For more on the reporting rules for the EEO-1 data, please see https://www.eeoc.gov/data/eeo-data-collections.

37 Retrieved from https://assets.aboutamazon.com/ff/dc/30bf8e3d41c7b250651f337a29c7/2021-amazon-consolidated-eeo-1-report-2p.pdf

Appendix C: Descriptive Data on the Weighted Sample

See Appendix B for information on race/ethnicity and gender.

Age	
18-24	17%
25-34	24%
35-44	24%
45-54	18%
55-64	14%
65+	2%
Tenure at Amazon	
Less than 3 months	7%
Between 3 and 6 months	10%
Between 6 months and a year	14%
Between 1 and 3 years	44%
Between 3 and 5 years	16%
More than five years	10%
Facility Type	
Fulfillment Center	71%
Sortation Center	9%
Delivery Station	11%
Other	9%
Geographic Region*	
Northeast	13%
Midwest	25%
South	42%
West	20%
* Based on U.S. Census Bureau-designated regions	