



SHARING THE PAIN

THE PRODUCTIVITY OF EMPLOYEES WITH MIGRAINES AND CHRONIC SEVERE HEADACHES

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THE ISSUE

Employees who suffer from migraines and other chronic severe headaches tend to report lower job performance and may be absent more often than other workers. How much of this difference is due specifically to the headaches they experience—and therefore potentially manageable with treatment—rather than due to unobservable differences in the types of people with different histories of chronic headaches is not well known. This poses a challenge to understanding the full benefit of therapeutically managing severe headaches.

EVIDENCE

Using IBI's HPQ-Select data for 32,545 employees from nine employers, we employ multivariate regression analyses to estimate the 28-day job performance and illness-related absences of employees with and without a history of migraines or chronic severe headaches. We then control for how much employees were bothered by headaches over the same 28-day period. We find that:

- About two-thirds of chronic headache sufferers reported being bothered by headaches "sometimes" or "a lot" over 28-days, compared to about one in 20 employees with no history of chronic headaches (about a third of whom reported being bothered by headaches at least "a little").
- 38% of employees with migraines and 75% of employees with "frequent and severe" headaches have never received treatment for their condition.
- Overall, 13-14% of chronic headache sufferers described their 28-day job performance as "low" (in terms of concentrating on work, working carefully and the quality of their work) compared to 11% of employees with no history of chronic headaches.
- Overall, chronic headache sufferers had between 0.6 and 0.8 missed work days due to illness over 28 days, compared to 0.4 days for employees with no history of chronic headaches.
- As headache frequency increased, job performance declined and illness-related absenteeism increased. Controlling for headache frequency completely explained the performance gap among employees with and without a history of chronic headaches, and explained a majority of the relationship between migraines and illness-related absences.

SOLUTION

These findings suggest that just as helping chronic headache sufferers manage their headaches can not only improve their quality of life, it can also improve their productivity on the job and their value to their employers. In addition to promoting migraine awareness in their workforce, employers can help chronic headache sufferers manage their conditions and their productivity by developing benefit plans that cover a range of treatment options across different clinical specialties.

Background

Migraines are intense, frequent headaches that can last for hours and are often accompanied by other symptoms such as nausea and sensitivity to light and sound.¹ Employees who suffer from migraines – either episodically or frequently enough to meet the clinical definition of a “migraineur” – and other chronic severe headaches tend to report lower job performance and may be absent more often than other workers.² How much of this difference is due specifically to the headaches they experience – and therefore potentially are manageable with treatment – rather than due to unobservable differences in the types of people with different histories of chronic headaches is not well known. This poses a challenge to understanding the full benefit of therapeutically managing chronic severe headaches.

To better understand whether managing chronic headaches therapeutically can result in better productivity – in terms of absence and job performance – we investigate three related questions:

1. Does productivity differ among employees with and without a history of migraines or other chronic headaches?
2. Is productivity related to how often an employee is bothered by headaches (even if they report no history of chronic headaches)?
3. Does headache frequency explain any productivity gaps among employees with and without a history of chronic headaches? In other words, if over a 28-day period chronic headache sufferers experienced relatively few headaches, would we expect them to be as productive as the general population of employees?

Data

The data come from survey items included in the World Health Organization’s (WHO) Health and Work Performance Questionnaire (HPQ). A team led by the HPQ’s principal investigator Dr. Ronald Kessler of the Harvard Medical School collected the data using a combination of web-based and paper survey administration. The final data for this analysis includes 32,545 employee surveys across nine employers.

¹ National Institute of Neurological Disorders and Stroke, [NINDS Migraine Information Page](http://www.ninds.nih.gov/disorders/migraine/migraine.htm), <<http://www.ninds.nih.gov/disorders/migraine/migraine.htm>>.

² See for example Goetzel Ron Z., Stacey R. Long, Ronald J. Ozminkowski et al., 2004, “Health, Absence, Disability, and Presenteeism Cost Estimates of Certain Physical and Mental Health Conditions Affecting U.S. Employers,” *Journal of Occupational and Environmental Medicine*, 46(4):398-412; and Lipton, Richard B., Walter F. Stewart, Seymour Diamond et al., 2001, “Prevalence and Burden of Migraine in the United States: Data from the American Migraine Study II,” *Headache: The Journal of Head and Face Pain*, 41(7):646-657.

DEPENDENT VARIABLE: 28-DAY JOB PERFORMANCE

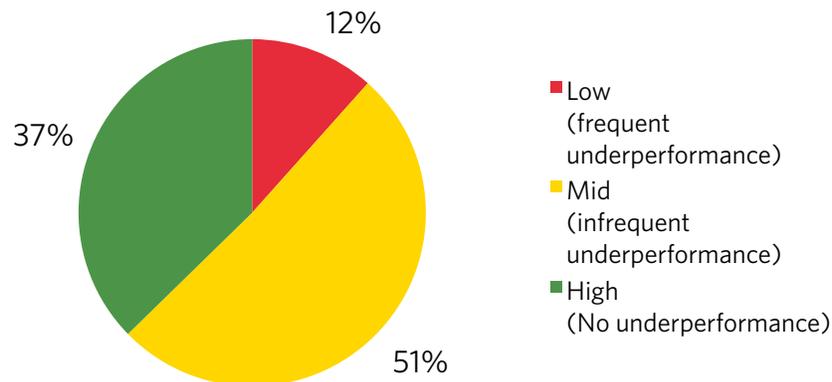
The HPQ includes 14 questions about workers' performance over the previous 28 days. We focus on responses to three questions revealed by factor analysis to have high correspondence:

1. "How often did you find yourself not working as carefully as you should?"
2. "How often was the quality of your work lower than it should have been?"
3. "How often did you not concentrate enough on your work?"

Employees could respond on a scale of 1 to 5 where 1 = "all of the time," 2 = "most of the time," 3 = "some of the time," 4 = "a little of the time" and 5 = "none of the time." For each employee we average the responses to create an overall scale with higher scores indicating better job performance. The scores are rounded to reproduce the five response options of the original items. Because relatively few employees indicated low performance we combine the "all of the time," "most of the time" and "some of the time" responses into a single category indicating frequent underperformance. "None of the time" represents no underperformance, and "a little of the time" is retained as a middle category (infrequent underperformance).

As seen in the chart below, half of employees reported high performance, compared to 12% who reported low performance.³

SUMMARY OF JOB PERFORMANCE OVER 28 DAYS (% OF EMPLOYEES)



DEPENDENT VARIABLE: 28-DAY ILLNESS-RELATED ABSENCES

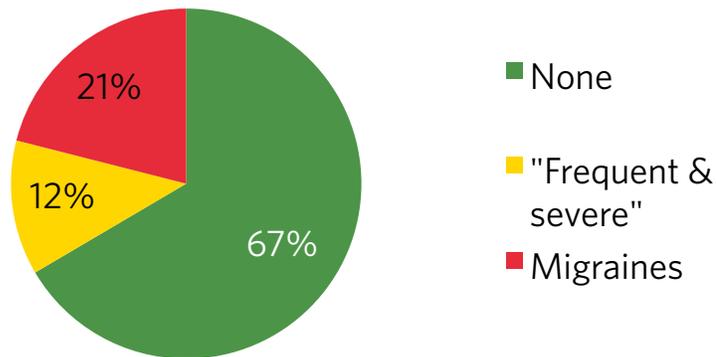
The survey asks how many workdays in the last 28 days an employee missed due their own illness, and responses range from zero to 28. A majority (80%) of employees did not miss any days due to illness and those who did missed an average of 2.4 days. The overall average was 0.5 missed days.

³ We additionally analyzed performance as measured by responses to a visual analogue scale, where 0 indicated the worst performance an employee could have on the job, and 10 indicate the best performance. The substantive findings were similar to those reported in this study. For simplicity, we focus on only the qualitative measurement of job performance.

CHRONIC HEADACHES AND MIGRAINES

The survey asks respondents if they have any of 26 chronic health conditions, regardless of whether or not they have ever received a physician's diagnosis. These conditions include both "frequent and severe headaches" and migraines as separate items. We therefore assign every person citing "migraines" to one category of employees with a history of chronic severe headaches, and the remaining "frequent and severe headache" sufferers to a separate category. These two groups are compared to employees with no history of migraines or chronic severe headaches. As seen in the chart below, 21% of employees reported suffering from migraines, while 12% reported a history of only "frequent and severe" headaches.

SUMMARY OF CHRONIC HEADACHE HISTORY (% OF EMPLOYEES)



The data also indicate that 38% of employees with migraines and 75% of employees with "frequent and severe" headaches have never received treatment for their condition.

28-DAY FREQUENCY OF ILLNESSES AND OTHER SYMPTOMS

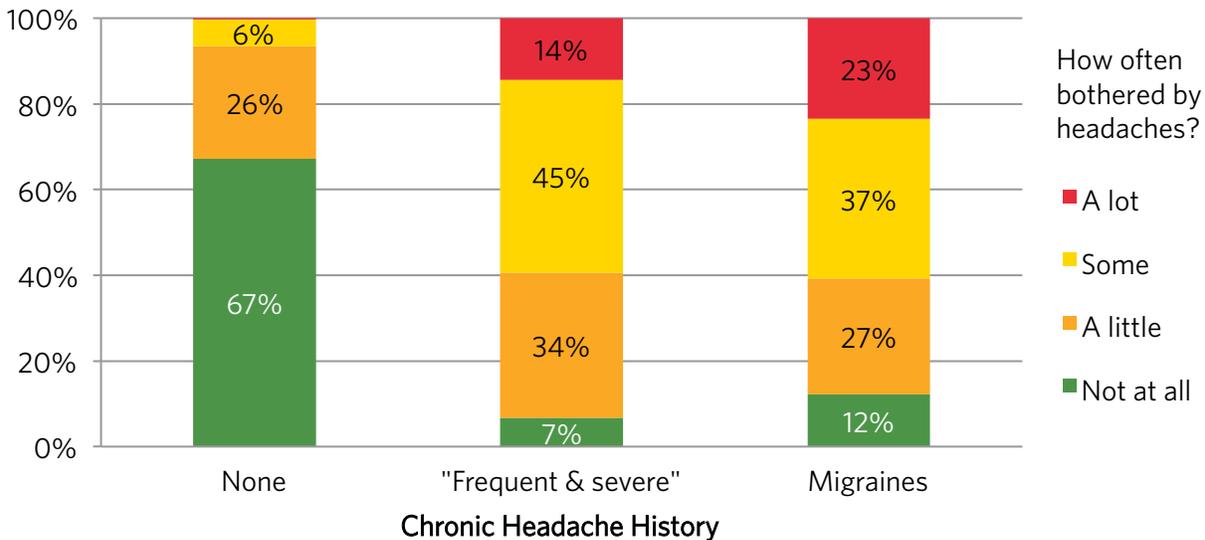
The survey includes 11 questions that ask how much an employee was bothered by a variety of physical illness symptoms in the past 28 days. Response options included 1 = "not at all," 2 = "a little," 3 = "some" and 4 = "a lot." Factor analyses indicated that some items measured an underlying type of illness, while others were unique symptoms. These symptom groups included:

- Headaches
- Feeling tired or having low energy
- Trouble sleeping
- Pain
 - Back or neck pain
 - Pain in arms, legs, or joints
 - Muscle soreness
- Cold symptoms
 - Water eyes, runny nose, or stuffy head
 - Cough or sore throat
 - Fever, chills, or other cold/flu symptoms
- Gastrointestinal symptoms
 - Constipation, loose bowels, or diarrhea
 - Nausea, gas, or indigestion

While the main interest in this study is on how often an employee was bothered by headaches, we investigate the effects of other types of symptoms as a check on whether headaches act as a proxy for feeling unwell more generally.

As expected, employees with a history of migraines or chronic headaches were significantly more likely to be bothered by headaches over the past 28-days. As the figure below shows, however, about a third of employees with no history of chronic headaches were bothered by headaches at least “a little.” Importantly, the frequency of headaches does not vary greatly among employees with migraines or “frequent and severe” headaches.

28-DAY HEADACHE FREQUENCY BY HISTORY OF CHRONIC HEADACHES



Note: values in chart columns may not sum to 100% due to rounding.

Chronic headache sufferers were also bothered by other illness symptoms more frequently than were employees with no history of chronic headaches, but the relationship was weaker.⁴

ANALYTIC METHOD

We measure the overall relationship between chronic headaches and job performance using a multivariate regression model⁵ that predicts an employee’s probability of low, middle or high performance based on their history of chronic headaches. A similar model is used to predict the number of days missed to an employee’s own illness.⁶ The regression models include personal and occupational demographics. We then estimate a second model that adds the measure of headache frequency. If the relationship across categories of headache history still differs significantly, we can say that absence or job performance differences are due to unmeasured differences in the groups of employees. If the relationship is no longer significant, we can say that the overall

⁴ For example, the gamma correlation between chronic headaches and 28-day headache symptoms for the table above was $\gamma = 0.76$ and significant below the .01 level. Gamma correlations for the other figures were also significantly different from zero, but in the 0.32 to 0.39 range.

⁵ The estimation method is ordinal logistic regression.

⁶ The estimation method is negative binomial regression.

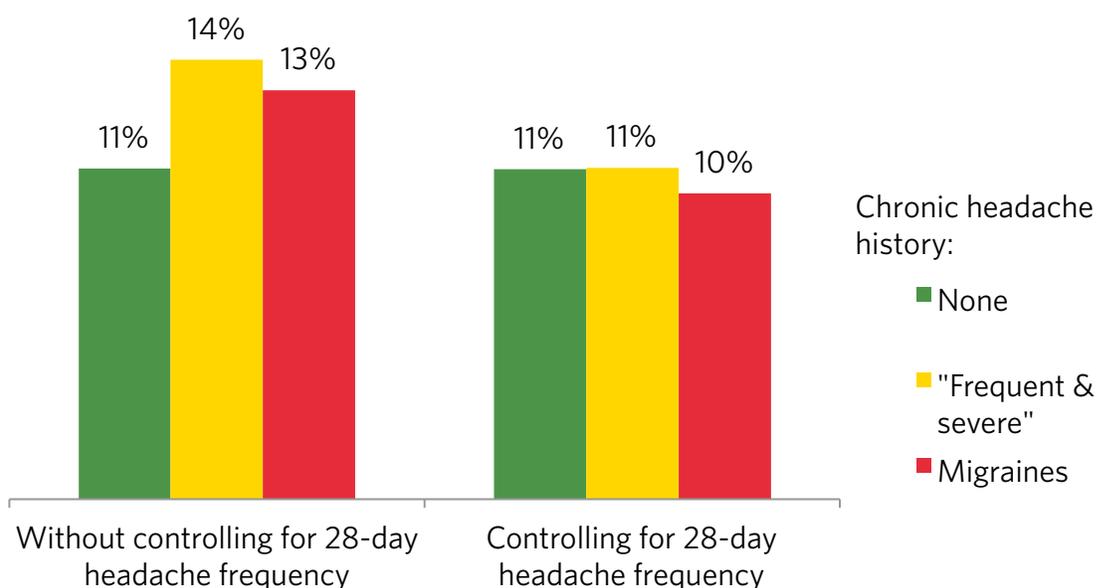
relationship can be “explained” by the frequency of headaches. We test the other illness symptoms individually in the same manner.

Job Performance

The chart below illustrates the estimated proportion of employees reporting low job performance based on their history of chronic headaches. As seen at the left of the chart, compared to employees with no history of chronic headaches, chronic headache sufferers are between 18% and 27% more likely to report low job performance in the last 28 days (13% or 14% of the total for the headache sufferers, compared to 11% of other employees). These differences are statistically significant.

HEADACHE SYMPTOMS COMPLETELY EXPLAINED THE PERFORMANCE GAP AMONG EMPLOYEES WITH AND WITHOUT A HISTORY OF CHRONIC HEADACHES

% of workers reporting low performance (i.e., not concentrating, not working carefully, low quality work most of the time) by history of chronic headaches



However, the frequency of headaches explains all of the observed job performance differences between chronic headache sufferers and other employees. Employees who tend to have more frequent headaches also tend to report worse job performance. As seen at the right of the chart, when the model controls for the frequency with which an employee was bothered by headaches, the proportion of low-performing employees are statistically equal at about 10%-11%.

In other words, over the course of a month, chronic headache sufferers who were relatively free of headaches performed on the job as well as workers with no headache history at all. The reverse interpretation also holds – workers with no history of migraines had worse job performance to the extent that they were bothered more frequently by headaches.

It is also worth noting that the overall job performance difference between employees who report migraines and employees who report only “frequent and severe headaches” is not statistically significant. This suggests that, at least for purposes of identifying employees whose job performance may benefit from managing headaches,

health risk assessment (HRA) questions could treat the terms “migraine” and “frequent and severe headache” interchangeably.

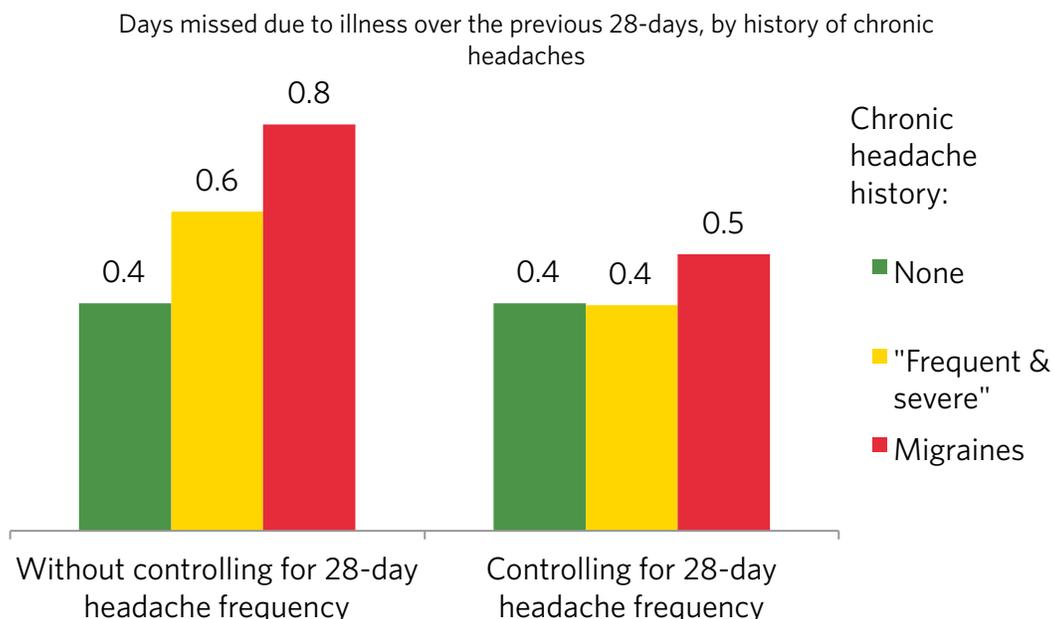
The frequency of other illness symptoms is also correlated with job performance; in general, the worse a person feels, the lower their job performance (the strongest relationship was between fatigue and job performance).

Importantly, however, **none of the illness symptoms besides headaches explained the job performance differences across employees with different histories of chronic severe headaches.** This suggests that the headache symptoms are not a proxy for illness symptoms more generally. Simply put, the evidence suggests that chronic headache sufferers perform worse on the job primarily because of their headaches - not because they are less healthy overall.

Illness-related absence

The results for illness-related absence were similar to those for job performance. As seen at the right in the chart below, chronic headache sufferers had significantly more absences over a 28 day period than did employees with no history of chronic headaches (between 0.6 and 0.8 days, compared to 0.4 days, respectively). When the model controls for frequency of headaches (shown at the left of the chart), the differences are reduced substantially. While chronic headache sufferers who were relatively free of headaches still had significantly more headaches than other employees (including employees who only report “frequent and severe” headaches), the frequency of being bothered by headaches nonetheless explained about 65% of the relationship between migraines and absence. As was observed with job performance, while other illness symptoms were related to absence, only the frequency of headaches explained the relationship between chronic headaches and absence.

HEADACHE SYMPTOMS EXPLAINED A MAJORITY OF THE ABSENCE GAP AMONG EMPLOYEES WITH AND WITHOUT A HISTORY OF CHRONIC HEADACHES



Commentary

These findings suggest that helping migraineurs and other chronic headache sufferers manage their headaches can not only improve their quality of life, it can also improve their productivity on the job and their value to their employers. The finding that employees with migraines and those who report “frequent and severe” headaches do not differ markedly in their symptoms or job performance outcomes suggests that employees and workplaces may benefit from greater migraine awareness and more accurate diagnosis and treatment. The relatively low treatment rate among employees who report “frequent and severe” headaches (but not migraines) underscores this point.

The challenge is that while the guidelines for diagnosing migraines are explicit,⁷ their pathophysiology is not well understood. As a consequence, many migraine sufferers seek to avoid triggers such as certain foods or to minimize stress and anxiety with behavioral therapy techniques. When a patient is diagnosed with migraines, medications to prevent or minimize the severity or duration of headaches and other symptoms are also widely prescribed. These include classes of drugs such as pain relievers, triptans, and ergots, but also cardiovascular drugs, antidepressants and botulinum toxin A.⁸

The diversity of migraine treatment options reflects the variety of current disease management strategies – for example, minimizing the severity and duration of episodes for patients who do not meet all the migraine criteria vs. reducing symptom frequency among migraineurs. In addition to promoting migraine awareness in their workforce, employers can help chronic headache sufferers manage their conditions and their productivity by developing benefit plans that cover a range of treatment options across different clinical specialties.

⁷ The [International Headache Society](http://ihs-classification.org/en/02_klassifikation/02_teil1/01.01.00_migraine.html) specifies several diagnostic criteria including at least five moderately severe headache attacks lasting four or more hours with a secondary symptom such as nausea or sensitivity to light or sound. <http://ihs-classification.org/en/02_klassifikation/02_teil1/01.01.00_migraine.html>

⁸ Mayo Clinic, [Disease and Conditions Guide: Migraine](http://www.mayoclinic.com/health/migraine-headache/DS00120/DSECTION=treatments-and-drugs) <<http://www.mayoclinic.com/health/migraine-headache/DS00120/DSECTION=treatments-and-drugs>>