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Which Health Conditions Impact on Productivity in Working Australians?

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Abstract

Objective: To identify health conditions associated with productivity loss in working Australians, adjusting for comorbidity, demographics, and work-related characteristics.

Methods: The Australian Work Outcomes Research Cost-benefit study cross-sectional screening data set was used to identify health-related productivity losses in a sample of approximately 78,000 working Australians. Data collected with the World Health Organisation Health and Productivity Questionnaire were analyzed using negative binomial logistic regression and multinomial logistic regression models for absenteeism and presenteeism, respectively.

Results: Health conditions impacted on both presenteeism and absenteeism. Drug and alcohol problems and psychological distress had a greater impact on absenteeism and presenteeism than other investigated health conditions. Demographic characteristics, health status (comorbidity), and work-related characteristics all impacted significantly on both absenteeism and presenteeism.

Conclusion: Mental health conditions contributed more strongly to productivity loss than other investigated health conditions.

Poor health status increases work-related absences and reduce overall work performance creating a substantial economic burden on industry.¹⁻⁹ Although there is considerable evidence of this, most studies have been conducted in the United States where employers pay staff health care as part of employee entitlement packages.^{2, 4-9} As no gold standard generic measure of productivity currently exists, studies have used a variety of productivity outcome measures and health conditions to explore the relationship between health and productivity, resulting in no conclusive understanding of which health conditions impact more heavily on productivity.

Until recently, the usual method of calculating productivity loss was through sickness absence alone.⁶ Studies that include work performance (presenteeism) are finding that it accounts for a greater proportion of the productivity loss than absenteeism.³

Including a measure of comorbidity is helpful when exploring the relationship between individual health conditions and productivity. Comorbidity can increase functional impairment and adversely influence the course of other conditions;¹⁰ for example, depressed people report significantly more comorbid medical conditions than nondepressed people.^{11, 12} Comorbidity is associated with greater productivity decrements,^{13, 14} increased functional disability,¹³ and reduced likelihood of being employed.¹⁵ It is also associated with poorer health outcomes,^{16, 17} poorer quality of life,^{14, 16} poorer treatment outcomes,¹⁸ and greater health care usage.^{14, 16} Therefore, it is important to adjust for comorbidity when considering the impact of individual health conditions on productivity loss.

Learning Objectives

- * Discuss the current state of knowledge on the effects of health status on productivity, including evidence for the effects of comorbidity and work-related characteristics.
- * Summarize the range of health conditions affecting presenteeism and absenteeism in this large sample of working Australians.
- * Identify the types of conditions associated with the greatest impact on productivity, as well as the most important confounding factors.

Similarly, work-related characteristics are also associated with productivity loss and/or health status. International and Australian studies have found that adverse working conditions result in both productivity decrements¹⁹⁻²² and health decrements.²³⁻²⁵ Work-related characteristics such as occupational class^{26, 27} have also been found to impact on

productivity. Therefore, these factors should be considered in statistical models when analyzing health and productivity.

This study aims to describe the impact on absenteeism and presenteeism for a range of health conditions in a large sample of working Australians. It addresses gaps in scientific knowledge in the following ways: it uses a large sample of working Australians thus providing information on a western country outside of the United States. It also provides data on absenteeism and presenteeism associated with health after adjusting for a wide range of known associated factors such as demographic characteristics, work-related characteristics, overall health status (comorbidity), and treatment-seeking behavior.

METHODS

Study Design

The Australian Work Outcomes Research Cost-benefit (WORC) project provides a large cross-sectional data set of approximately 78,000 working Australians to explore associations between health and absenteeism and health and presenteeism. The WORC study has been comprehensively discussed previously.^{28, 29}

Study Sample

All employees of 58 large companies located in both urban and rural Australia were invited to participate in the WORC study. Ten industry groups were included. The largest samples were from health, education, government, and finance. The surveys were received between October 2004 and December 2005.

Study Measures

The validated World Health Organisation Health and Productivity Questionnaire identifies self-reported health status for 28 health conditions.^{30, 31} It probes self-reported absenteeism rates and productivity patterns and screens for psychological distress using the Kessler 6 (K6).^{2, 32} Self-reported absenteeism was measured by the number of days and part days missed from work in the previous 4 weeks. Part days were treated as 0.5 day. All days and part days were summed to a total number of days. Presenteeism was measured using a self-rated score of overall performance in the past 4 weeks using a 0 to 10 scale (0 = worst possible performance, 10 = best possible performance). In preparation for the work performance question, a series of memory priming and decomposition questions were asked, which were applicable across occupations. Then a series of internal anchoring questions were asked to enable the respondent to make comparisons with their own average performance and with their coworker. The overall self-reported work performance (presenteeism) score (0 to 10) is categorized into low, average, and high performance. Most people tend to score themselves highly; therefore, the following categories are used: a low score is less than 6, an average score is 6 to 9, and a high score is 10.³³

Self-reported health status has been coded for this study as “yes” if respondents reported having the condition and either currently or previously having received professional treatment for that condition(s), and “no” if they report never have had the condition.

Respondents were excluded if they reported having a condition but never received treatment as these respondents may have incorrectly self-diagnosed the health problem (average of 0.05% excluded per condition). Conditions included were arthritis, asthma, back/neck pain, cancers (excluding skin cancer), chronic obstructive pulmonary disease (COPD), cardiovascular disease (CVD), psychological distress (being a K6 score of 13 and more), drug and alcohol problems, diabetes, fatigue, high blood pressure, high cholesterol, injury, migraine, and obesity.

Other covariates included in models were demographic characteristics of age, sex, marital status, number of children, education level, and annual income; health characteristics of general treatment-seeking behavior (number of occasions of treatment for any reason except pregnancy, not treatment for a specific condition) and the number of comorbid conditions; and work-related factors of occupation, industry, public/private sector, job security (using proxy of part-time or full-time compared to casual), contractor, the rate of workplace accidents per 100 workers in the previous 4 weeks, hours worked in previous week, supervisory role (number of staff supervised), and hours expected to work in a 7-day week by their employer (as perceived by respondent).

Statistical Analysis

For each health condition, two regression models were developed. One that considered absenteeism as the outcome and one that considered presenteeism as the outcome. Covariates from the earlier-mentioned list were included in models if significant in bivariate analyses. To account for multiple comorbidities, our models adjusted for the number of comorbid conditions using the groupings recommended by Kessler (no health conditions, one condition, two to four, five to seven, eight to ten, or eleven or more conditions).³³ For absenteeism, the data were most suited to a negative binomial regression model. For presenteeism, multinomial logistic regressions were used to explore factors associated with low self-reported work performance (presenteeism). The reference category was moderate performance. High performance results are not reported here, as we are only interested in health associations with underperformance. Initially, forward stepwise methods were used, identifying the need to perform separate models for each health condition to avoid collinearity. Following this, backward stepwise methods were used for each health condition model separately, excluding nonsignificant covariates from each model.

RESULTS

The response rate was 24.7% providing 90,279 responses, from this, a sample of 78,430 workers had complete absenteeism data; and a sample of 77,455 workers had complete presenteeism data. Respondents' demographic characteristics available through the Health and Productivity Questionnaire are described in [Table 1](#). The sample included part-time, full-time, and casual workers. Approximately, 80% were aged 30 to 59 years. More than half (65%) were women, which is greater than the proportion in the Australian workforce.³⁴ The sample also has greater representation of workers from industries of health, education, and government administration and fewer from retail, construction, and mining.³⁴ The average income and education level are fairly representative of the Australian population.³⁴

Table 1

Absenteeism

The median of the reported number of days absent in the previous 4 weeks was one (Interquartile range: 0 to 3). Before adjusting for known associated factors, all health conditions had significant ($P < 0.001$) impact on absenteeism. Ranging from an incident risk ratio (IRR) of 1.11 (95% CI, 1.04 to 1.17) for high cholesterol to an IRR of 1.75 (95% CI, 1.38 to 2.20) for drug and alcohol problems.

The adjusted impact of health conditions on absenteeism is described below in Table 2. Self-reported drug and alcohol problems had the highest risk of absenteeism (IRR: 1.41; 95% CI, 1.13 to 1.77), followed by psychological distress (K6), COPD, workplace injury, cancer, arthritis, obesity, back/neck pain, and asthma. Conditions that were not significantly associated with absenteeism in adjusted models were fatigue, migraine, and CVD. Conditions that were associated with a reduced risk of absenteeism were diabetes, high cholesterol, and high blood pressure. Although most of the IRR values were statistically significant, effect sizes were quite small. While statistically significant, the conditions of clinical significance are more likely to be drug and alcohol problems, psychological distress, workplace injury, cancers, and possibly arthritis.

Table 2

Presenteeism

In this sample, the mean reported score of overall self-reported work performance on a score range of 0 to 10 (with 10 being very high work-performance) in the previous 4 weeks was 7.97 (SD: 1.35). When grouped into low, moderate, and high self-reported work performance, 5% reported low performance, 86% reported moderate performance, and 9% reported high performance.

With the exception of cancer, high blood pressure, and high cholesterol, all health conditions demonstrated an unadjusted increased risk of presenteeism. The increased relative risk ranged from RRR: 6.72 (95% CI, 6.11 to 7.39) for psychological distress to RRR: 1.21 (95% CI, 1.02 to 1.44) for arthritis.

After adjusting for demographic characteristics, the number of comorbidities, general treatment-seeking behavior, and known work-related characteristics, the health conditions most strongly associated with an increased risks of presenteeism were psychological distress (RRR: 4.32; 95% CI, 3.88 to 4.80), drug and alcohol problems, fatigue, work-related injury, and obesity (see [Table 3](#)). COPD also had an increased risk; however, this was a trend only.

Health Condition	Presenteeism		Absenteeism	
	n	RRR (95% CI)	n	RRR (95% CI)
All	28,778	1.00	10,245	1.00
Age				
< 25	1,024	1.00	348	1.00
25-34	11,088	1.00	3,721	1.00
35-44	10,800	1.00	3,654	1.00
45-54	7,000	1.00	2,388	1.00
55-64	4,000	1.00	1,354	1.00
65+	2,966	1.00	980	1.00
Sex				
Male	15,000	1.00	5,100	1.00
Female	13,778	1.00	5,145	1.00
Ethnicity				
White	20,000	1.00	6,800	1.00
Black	4,000	1.00	1,300	1.00
Hispanic	3,000	1.00	1,000	1.00
Other	2,778	1.00	1,145	1.00
Education				
< High school	1,000	1.00	300	1.00
High school	10,000	1.00	3,000	1.00
Some college	10,000	1.00	3,000	1.00
College graduate	7,778	1.00	2,945	1.00
Marital status				
Married	15,000	1.00	5,100	1.00
Single	10,000	1.00	3,000	1.00
Divorced	2,000	1.00	700	1.00
Widowed	1,778	1.00	645	1.00
Health insurance				
Medicaid	1,000	1.00	300	1.00
Medicare	1,000	1.00	300	1.00
Private	16,778	1.00	6,645	1.00
Uninsured	8,000	1.00	2,900	1.00
Comorbidities				
0	10,000	1.00	3,000	1.00
1	10,000	1.00	3,000	1.00
2	7,778	1.00	2,945	1.00
3+	8,000	1.00	3,000	1.00

Table 3

Several conditions were associated with a reduced risk of presenteeism. These were asthma, high blood pressure, and back/neck pain. The following conditions also demonstrated a trend of reduced risk: cancer, migraine, and high cholesterol. Several conditions were not significantly associated with presenteeism (arthritis, CVD, and diabetes).

DISCUSSION

A greater number of health conditions were associated with a risk of absenteeism than presenteeism. However, for those conditions that were associated with presenteeism, the magnitude of the risk was generally greater than that of absenteeism. In adjusted models, mental health factors such as drug and alcohol problems and psychological distress had a greater impact on presenteeism than any other health condition considered. This pattern was the same for absenteeism. Other studies have also reported health conditions impacting more strongly on presenteeism than on absenteeism.^{3, 5, 6, 9}

It is difficult to compare across studies when ranking the impact of health conditions on absenteeism or presenteeism, because studies differ in productivity measures used, health conditions investigated, covariates included, and the samples used. Therefore, we limit our discussion to whether other studies also found an association, not the comparative size of their effect. There is evidence of drug and alcohol problems being associated with productivity losses^{4, 7}; however, drug and alcohol problems are not commonly included in the list of health conditions investigated. More common is psychological distress (including depression), which is often found to adversely impact on productivity.^{3, 4, 8, 9, 35} This finding is consistent with evidence using Australian data that showed averting a mental health condition had the largest positive impact on labor force participation compared to cancer, CVD, major injury, diabetes, and arthritis.³⁶ Other health conditions that we found to be associated with productivity loss are supported by the literature. For example, in one study,³⁷ workplace injury and obesity were both found to be associated with productivity loss; other studies^{3, 9, 38-40} also found obesity to be associated with productivity loss. There is also evidence of COPD impacting heavily on productivity losses.⁶⁻⁸

Potential confounding factors need to be included in models exploring health impacts on productivity. Demographic factors, health status, and work-related characteristics all significantly impacted on absenteeism and presenteeism. We found that while all health

conditions had a significant effect on both absenteeism and presenteeism in unadjusted models, these effects diminished considerably after associated factors were included. Some health conditions no longer demonstrated a significant impact after adjustment. Kessler³³ emphasized the importance of including comorbidities in estimating productivity losses associated with health conditions, and much research has been done to demonstrate the effects of work-related characteristics on productivity.^{19, 41-44} However, we found only two studies that explore the relationship between health and productivity that had included work-related characteristics in their analysis.^{3, 38} One study adjusted for job satisfaction only,³⁸ and the other adjusted for occupation only.³ This brings into question the validity of the strength of association for particular health conditions when these factors are not adjusted for.

In many studies exploring productivity and health, other covariates tend not to be considered. Including available confounding factors in our analyses enables better adjustment for these factors. To demonstrate, our study found that arthritis was associated with absenteeism but not with presenteeism in adjusted models; however, two other studies report a larger proportion of productivity loss associated with presenteeism than with absenteeism.^{45, 46} One was a case-control study, the other a retrospective audit of arthritis sufferers only.⁴⁵ Comorbidity was not taken into account for either of these studies. Our study also found an association with presenteeism using crude estimates, but once comorbidity and other covariates were included, this association was no longer significant. This finding is consistent with a US study, which looked at comorbidity with arthritis and found that 81% of people with arthritis had at least one other comorbid condition.⁴⁷

There are some limitations to our study that need to be considered. Associations between factors were determined in this cross-sectional study; however, no conclusions can be drawn regarding causal pathways. As this is an opportunistic sample of willing employees from 58 large organizations, the sample has more white-collar workers than the general population. Industry type and work role were included in models to adjust for these potential differences; however, extrapolation of these findings to the general employed population should be done with caution. It should also be considered that only those at work during the data collection period responded. It could be that people on extended sick leave or out of the workforce are not represented. This may explain our cancer results, as other studies have demonstrated a strong association between productivity losses and cancer.⁴ Other limitations include the self-reported nature of health conditions, the overrepresentation of women, the absence of some top burden of disease conditions such as kidney diseases and the absence of some relevant work-related characteristics such as decision-making control.

This study highlights the strong impact of mental health conditions on absenteeism and presenteeism. It also highlights the potential for inflated risks of health-related productivity loss when significant related factors are not included, such as comorbidity, work-related characteristics, and treatment-seeking, and adds to the body of evidence that presenteeism has a significant impact on productivity loss.

CONCLUSIONS

Health conditions have a greater impact on performance while at work than on absenteeism. Mental health has a greater impact on absenteeism and presenteeism than the majority of

chronic diseases included in this study. Studies exploring health-related productivity losses should include work performance measures and should adjust for demographic characteristics, health (comorbidity) status, and work-related characteristics.

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