

Research report

Which presenteeism measures are more sensitive to depression and anxiety?

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Received 31 August 2006; accepted 30 October 2006

Available online 6 December 2006

Abstract

Background: Lost productivity from attending work when unwell, or “presenteeism”, is a largely hidden cost of mental disorders in the workplace. Sensitive measures are needed for clinical and policy applications, however there is no consensus on the optimal self-report measure to use. This paper examines the sensitivity of four alternative measures of presenteeism to depression and anxiety in an Australian employed cohort.

Methods: A prospective single-group study in ten call centres examined the association of presenteeism (presenteeism days, inefficiency days, Work Limitations Questionnaire, Stanford Presenteeism Scale) with Patient Health Questionnaire depression and anxiety syndromes.

Results: At baseline, all presenteeism measures were sensitive to differences between those with ($N=69$) and without ($N=363$) depression/anxiety. Only the Work Limitations Questionnaire consistently showed worse productivity as depression severity increased, and sensitivity to remission and onset of depression/anxiety over the 6-month follow-up ($N=231$). There was some evidence of individual depressive symptoms having a differential association with different types of job demands.

Limitations: The study findings may not generalise to other occupational settings with different job demands. We were unable to compare responders with non-responders at baseline due to anonymity.

Conclusions: In this community sample the Work Limitations Questionnaire offered additional sensitivity to depression severity, change over time, and individual symptoms. The comprehensive assessment of work performance offers significant advantages in demonstrating both the individual and economic burden of common mental disorders, and the potential gains from early intervention and treatment.

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Keywords: Depression; Anxiety; Presenteeism; Absenteeism; Employee

1. Introduction

Presenteeism is broadly understood to reflect the phenomenon of attending work when sick (Aronsson et al., 2000), or “working through illness” (McKevitt et al., 1997). Presenteeism has been estimated to account

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for a majority of the economic cost of lost productivity from depression (Collins et al., 2005), as much as 86% (Stewart et al., 2003). This hidden cost of mental disorders in the workplace adds an extra dimension to estimating the individual and societal burden of mental disorders, and the potential gains from effective intervention or prevention.

In contrast to absenteeism which is readily validated against administrative records (Ferrie et al., 2005), presenteeism is usually assessed by generic, self-report measures that are applicable to any job. Measures vary in complexity from single items assessing the number of days in a given period in which the person attended work when unwell (Aronsson et al., 2000), to adjusting time at work for perceptions of productivity in relation to self and/or colleagues (Brouwer et al., 1999; Kessler et al., 2003; Stewart et al., 2003; Wang et al., 2003), to domain-based measures that assess health-related limitations in specific job demands (Koopman et al., 2002; Lerner et al., 2004a).

It has recently been suggested that measuring presenteeism *per se* may be more important than the specific type of presenteeism measure used (Collins et al., 2005). To date, there is insufficient research to support the equivalency of different measures or to help researchers and practitioners choose a measure that is most appropriate for their purposes. Head-to-head comparative studies of more than two presenteeism measures are rare. Most studies have only investigated whether measures are sensitive to differences between those with and without symptoms, so little is known about comparative sensitivity to symptom severity and change over time. Most epidemiologic research on presenteeism has used a non-standard measure of mental health (Sanderson and Andrews, 2006).

The aims of the study were to compare four presenteeism measures on their detection of clinically meaningful differences in depression and anxiety status as measured by the Patient Health Questionnaire (Kroenke et al., 2001). Presenteeism measures included the number of days attending work unwell, the equivalent number of days after adjusting for self-perceived productivity, and two domain-based measures that were developed specifically to include the cognitive/social aspects of work which may be more sensitive to mental health symptoms: the Work Limitations Questionnaire (WLQ, Lerner et al., 2004a) and the Stanford Presenteeism Scale (SPS-6, Koopman et al., 2002). We compared measures on their sensitivity to presence versus absence of depression and anxiety, symptom severity, and change in depression and anxiety over 6 months follow-up. We hypothesized that the more detailed, domain-based measures (WLQ, SPS-6)

would show greater sensitivity in all cross-sectional and prospective comparisons than the other presenteeism measures and absenteeism. There has also been one study suggesting the WLQ subscales may be able to discriminate at the level of different types of depressive symptoms (Lerner et al., 2004a). We extended this in a secondary analysis by examining whether there was a differential association between the nine individual symptoms of depression and interference in different types of job demands as measured by the WLQ. We hypothesized that physical symptoms would be associated more strongly with physical work demands and cognitive/affective symptoms with mental work demands. This study builds on previous research by investigating whether more detailed presenteeism measures offer any additional information over briefer alternatives, both for cross-sectional comparisons and a naturalistic observation of change over time, and by using a standardised measure of depression and anxiety in a routine workplace setting.

2. Method

2.1. Design and study setting

The study represented a single-group, prospective design with measurement 6 months apart. The setting was call centres in the South-East region of Queensland, Australia, including the metropolitan centre of Brisbane. Call centres have been a common setting for development and evaluation of presenteeism measures. Data were collected by a self-report questionnaire of approximately 200 items (number of items varied due to internal skips).

2.2. Measures

Depression and anxiety: The Patient Health Questionnaire (PHQ) depression and anxiety modules were used (Kroenke et al., 2001; Löwe et al., 2003). Based on DSM-IV, diagnostic variables include *major depressive syndrome* defined as a total of at least 5 symptoms including either “loss of interest or pleasure” or “feeling down”; *minor depressive syndrome* is similar but requires only 2, 3 or 4 symptoms; *panic syndrome* defined as all four panic attack questions plus at least four of the eleven specific panic attack symptoms (e.g. short of breath, sweating, choking); *other anxiety syndrome* defined as feeling nervous, anxious on edge or worrying a lot plus at least three of an additional six symptoms (e.g. restless, tire easily, muscle tension, irritability). The PHQ has been validated against structured clinical interviews and clinician diagnosis

(Löwe et al., 2003, 2004b), shown to be sensitive to change (Löwe et al., 2004a), and used in surveys of lost productivity from depression (Lerner et al., 2004a; Stewart et al., 2003).

Presenteeism: All measures had a 4-week recall period. The first presenteeism measure assessed the number of days attending work while suffering from health problems (*presenteeism days*) (Aronsson et al., 2000). The second presenteeism measure adjusted these presenteeism days by a percent rating of perceived productivity (Koopman et al., 2002) to estimate lost productivity from being at work unwell (*inefficiency days*) (Brouwer et al., 1999). For example, 10 presenteeism days with 100% productivity produces no productivity loss, while these 10 days worked at 50% productivity is equivalent to 5 days lost.

The Work Limitations Questionnaire (Lerner et al., 2004a,b, 2003) has 25 items summarised as 4 scales that represent the percentage of time that a person was limited in particular job demands: time and scheduling demands such as working without stopping or taking breaks and getting going easily at the beginning of the workday (*WLQ Time*); physical work demands such as sitting, standing or staying in one position for longer than 15 min while working and using hand-held equipment (e.g. phone) (*WLQ Physical*); mental-interpersonal work demands such as thinking clearly when working and speaking with people in-person, in meetings or on the phone (*WLQ Mental*); and output demands, such as working fast enough and doing work without making mistakes (*WLQ Output*). Cronbach's alpha of 0.84 and higher were reported in a study that included call centre employees using the 2-week version (Lerner et al., 2003), with comparable values in the present study of 0.89 or higher. The 6-item Stanford Presenteeism Scale (Koopman et al., 2002) assesses overall performance at work (e.g. handling stress, enjoyment of work, feeling energetic enough to complete work), which are summed to give a total score (*SPS-6*) with higher scores representing better functioning (range 6–30). In the present study, Cronbach's alpha was acceptable at 0.70, in comparison to the original study with alpha of 0.80. For comparison to presenteeism, *absenteeism days* assessed missed days from work because of problems with physical or mental health.

Other factors: Potential covariates included age, gender, marital status, level of education, whether combining work with studying, employment contract, number of hours worked, days of the week usually worked, and presence of common physical conditions which have been associated with lost work productivity (including arthritis, migraines, chronic pain, seasonal allergies/hay fever, asthma, chronic

bronchitis, diabetes, obesity, and substance use problems) (Kessler et al., 2003).

2.3. Data collection

In the absence of a publicly available sampling frame for call centres (partly due to a reluctance to disclose physical locations for security reasons), we compiled a list of organisations with call centres in the study region ($N=47$) using web searches, systematically telephoning organisations listed in public business directories, and through referral from other call centre managers as the recruitment progressed. Five organisations agreed to participate. In addition, the study was advertised in trade newsletters and online resources, resulting in a further 6 organisations contacting the researchers of which 5 agreed to participate. These 10 organisations included a total of 817 call centre employees, and represented both public and private sector and a range of industries (e.g. government, manufacturing, transport, education, finance). All 817 employees were invited to participate in the study. Data collection was staggered across organisations, with baseline data collected August to December 2004 and the 6-month follow-up in February to June 2005. Baseline questionnaires were distributed to all employees via their workplace, to be completed in their own time and returned to the investigators with a reply paid envelope. Various strategies were used to increase response rate including reminder letters and replacement questionnaires, promotion of study at each worksite, and a draw to win a \$200 gift voucher at each data collection time point.

2.4. Analysis

Analysis was conducted using SAS Version 9.1.2. The analysis sample comprised all employees with complete data on the independent variables (depression and anxiety syndromes) and no more than one missing dependent variable, with the missing dependent variable imputed from the sample mean. Analyses were repeated with and without imputed cases, and the same significant findings were observed. Data were pooled across the ten organisations, with the magnitude of clustering effects estimated from intra-cluster correlation coefficients (ICCs). ICCs are usually between 0.01 and 0.02 in human studies, meaning that between 1 and 2% of the variance is accounted for by differences between clusters (Killip et al., 2004). Most of the ICCs from the present study were of this magnitude: absenteeism days 0.00, presenteeism days 0.010, inefficiency days 0.036, WLQ Time 0.010, WLQ

Table 1

Baseline sociodemographic characteristics, employment characteristics, and prevalence of Patient Health Questionnaire diagnoses.

	All employees <i>N</i> =432	
	<i>N</i>	%
<i>Sociodemographic characteristics</i>		
Gender		
Female	333	77.1
Male	98	22.7
Age		
18–30 years	117	27.1
31–40 years	116	26.9
41–50 years	118	27.3
51 years or older	81	18.8
Marital status		
Currently married/de facto	266	61.6
Never married or separate/widowed/divorced	163	37.7
Educational attainment		
High school only	186	43.1
Post high-school	242	56.0
Currently studying		
No	379	87.7
Yes	51	11.8
<i>Employment characteristics</i>		
Employment contract		
Permanent or ongoing	366	84.7
Fixed-term	21	4.9
Casual	45	10.4
Number of hours usually worked in an average week		
1–15 hours	25	5.8
16–34 hours	145	33.6
35 hours or more	262	60.6
Days of the week usually worked		
Weekdays only	242	56.0
Weekdays and week-ends	36	8.3
Days vary week to week (may include Saturday/Sunday)	151	35.0
<i>Patient Health Questionnaire diagnoses</i>		
Minor depressive syndrome	24	5.6
Major depressive syndrome	25	5.8
Panic syndrome	27	6.3
Other anxiety syndrome	16	3.7
Any depressive or anxiety syndrome	69	16.0

Percent may sum to slightly less than 100% due to small amounts of missing data.

Physical 0.036, WLQ Mental 0.012, WLQ Output 0.005, SPS-6 0.016.

Separate linear regression models were fitted for each presenteeism and absenteeism measure as the dependent variable, as the comparative performance of individual measures was of interest. The independent variable for each set of regressions represented a difference in depression/anxiety status that we hypothesized presentee-

ism measures would be sensitive to. A measure of presenteeism or absenteeism was considered sensitive to an expected difference if the independent variable was significant at the $p < 0.05$ level. In the first regressions, the independent variable was presence versus absence of depressive and anxiety syndromes (any versus none). In the second regressions, the independent variable was depression symptom severity (dummy variables representing no depression versus minor depression, and minor depression versus major depression). In the third regressions, the independent variable was change in depression/anxiety over 6 months, represented by dummy variables comparing no syndrome at both time points (*remained syndrome free*) with syndrome free at baseline but syndrome at follow-up (*onset*), syndrome at baseline but none at follow-up (*remitted*), and syndrome at both time points (*persisted*). The final set of regressions examined whether the WLQ subscales were able to discriminate at the level of different types of depressive symptoms. The dependent variable was each WLQ subscale and the independent variables were presence/absence of the 9 symptoms of DSM-IV depression (symptom present for at least half the days versus not), controlling for all other symptoms and severity of depressive syndrome (none, minor, major). Depression severity was adjusted for as some symptoms are more likely to be reported by more severe depression (e.g. suicidality).

All models were adjusted for clustering, and included age, gender, and presence of chronic physical health conditions (which included seasonal conditions such as colds/flu and allergies), as these covariates are known to be associated with both depression/anxiety and productivity loss and thus are potential confounders. Other potential covariates as listed above were not found to be associated with both depression/anxiety and presenteeism or absenteeism.

3. Results

3.1. Sample description

Of the 817 questionnaires distributed at baseline, 436 (53.4%) were returned. The baseline analysis sample ($N=432$) included 30 persons (6.9%) with an imputed value on one dependent variable. The sample was predominately female and aged over 30 (see Table 1). A majority of the participants worked full-time and only on weekdays, and most had permanent employment contracts. Sixteen percent ($N=69$) of the participants met criteria for any of the depression or anxiety syndromes.

Of the 436 baseline participants, 379 (86.9%) provided contact details and permission to be sent a 6-

Table 2

Presenteeism and absenteeism in the past 4 weeks for all employees at baseline ($N=432$) and by depression/anxiety status: no syndrome versus any of minor depressive syndrome, major depressive syndrome, panic syndrome, and other anxiety syndrome

	All employees		No depression/ anxiety		Any depression/ anxiety		Predicted difference for any syndrome versus no syndrome ^a		
	$N=432$		$N=363$		$N=69$		B	s.e.	p
	Mean	s.d.	Mean	s.d.	Mean	s.d.			
Absenteeism days	1.2	1.9	1.1	1.8	2.0	2.1	0.9	0.3	0.010
Presenteeism days	3.2	5.5	2.7	5.1	5.9	6.7	3.0	0.7	0.002
Inefficiency days	0.7	1.8	0.5	1.2	1.7	3.5	1.1	0.4	0.028
WLQ Time	16.7	19.3	13.7	16.9	32.6	23.3	17.4	2.6	<0.0001
WLQ Physical	15.5	22.3	13.3	20.8	27.1	26.1	12.5	1.2	<0.0001
WLQ Mental	13.8	15.9	10.8	12.4	29.4	22.3	17.7	1.9	<0.0001
WLQ Output	14.3	17.4	11.3	14.0	30.2	24.1	18.0	2.8	0.0001
SPS-6	22.7	5.2	23.4	5.1	19.3	4.5	-3.8	0.4	<0.0001

Note: WLQ = Work Limitations Questionnaire, SPS-6 = Stanford Presenteeism Scale. Higher scores indicate worse functioning for all measures except SPS-6.

^a Adjusted for gender, age, and chronic physical health condition/s. $N=5$ had missing values for one of the covariates and were excluded from the analysis.

month follow-up survey. With 242 surveys returned, this gave a response rate of 63.9% among those eligible to be followed up. A useable sample size of 231 was obtained, including 16 (6.9%) with an imputed value on one dependent variable. Non-responders and responders at follow-up were compared on baseline data. This showed that non-responders were significantly more likely at baseline to be aged 18–30 years ($p<0.0001$) and have worse productivity on WLQ Time ($p=0.0007$) and WLQ Mental ($p=0.012$) compared to responders. There were no baseline differences between responders and non-responders in gender, depression and anxiety prevalence, or physical health condition prevalence.

3.2. Sensitivity of presenteeism measures to depression and anxiety

At baseline, significant differences between employees with and without any of the depressive or anxiety syndromes were observed for all presenteeism measures and absenteeism (see Table 2). In the previous 4 weeks, employees with depression reported an average of nearly twice as many absenteeism days, twice as many presenteeism days, more than three times as many inefficiency days, and more than double the percent of time limited on the job for the different job demands as measured by the WLQ subscales. The difference

Table 3

Presenteeism and absenteeism in the past 4 weeks by depression severity at baseline

	No depressive syndrome		Minor depressive syndrome		Major depressive syndrome		Predicted difference for minor syndrome versus no syndrome ^a			Predicted difference for major syndrome versus minor syndrome ^a		
	$N=383$		$N=24$		$N=25$		B	s.e.	p	B	s.e.	p
	Mean	s.d.	Mean	s.d.	Mean	s.d.						
Absenteeism days	1.1	1.8	1.3	1.5	2.7	2.5	0.1	0.2	0.69	1.3	0.4	0.012
Presenteeism days	2.8	5.1	3.8	4.6	8.7	7.9	0.7	0.4	0.09	4.8	0.7	0.0001
Inefficiency days	0.5	1.2	0.9	1.2	3.2	5.3	0.3	0.1	0.06	2.3	1.0	0.05
WLQ Time	14.3	17.4	28.4	17.3	42.8	26.5	12.3	3.8	0.010	13.6	4.8	0.019
WLQ Physical	13.9	21.3	30.1	30.0	26.7	20.4	14.5	3.3	0.002	-4.2	3.0	0.20
WLQ Mental	11.4	12.9	23.1	15.7	41.1	26.5	10.5	2.4	0.002	17.5	3.6	0.0009
WLQ Output	11.9	14.2	24.9	20.2	42.0	29.1	12.0	3.1	0.004	16.6	3.8	0.002
SPS-6	23.2	5.1	19.8	3.8	18.6	5.0	-3.1	0.8	0.004	-1.1	0.9	0.25

Note: WLQ=Work Limitations Questionnaire, SPS-6=Stanford Presenteeism Scale. Higher scores indicate worse functioning for all measures except SPS-6.

^a Adjusted for gender, age, and chronic physical health condition/s. $N=5$ had missing values for one of the covariates and were excluded from the analysis.

Table 4

Change in presenteeism and absenteeism by depression/anxiety syndrome status (0 = absent, 1 = present) at baseline and 6 months. Change scores for the onset, remitted, and persisted groups are compared to the group that remained syndrome free

	Remained syndrome free (0,0)			Onset (0, 1)				Remitted (1, 0)				Persisted (1, 1)			
	N=174			N=21				N=20				N=16			
	Baseline	6 months	Change	Baseline	6 months	Change	p	Baseline	6 months	Change	p	Baseline	6 months	Change	p
	Mean (s.d.)	Mean (s.d.)	Mean (s.d.)	Mean (s.d.)	Mean (s.d.)	Mean (s.d.)		Mean (s.d.)	Mean (s.d.)	Mean (s.d.)		Mean (s.d.)	Mean (s.d.)	Mean (s.d.)	
Absenteeism days	0.9 (1.7)	0.9 (2.6)	0.0 (2.8)	1.7 (1.7)	2.6 (3.8)	−0.9 (3.4)	0.26	1.5 (1.8)	1.9 (3.8)	−0.4 (3.7)	0.65	1.9 (2.2)	2.1 (4.1)	−0.1 (3.7)	0.96
Presenteeism days	2.5 (5.2)	2.9 (5.8)	−0.4 (6.3)	5.6 (7.4)	8.0 (8.7)	−2.4 (7.4)	0.15	5.8 (7.6)	2.7 (4.3)	3.1 (6.0)	0.009	5.4 (5.7)	12.6 (9.7)	−7.2 (8.4)	0.0004
Inefficiency days	0.4 (0.9)	0.6 (1.6)	−0.2 (1.5)	1.3 (1.6)	1.9 (2.8)	−0.6 (2.8)	0.27	1.1 (1.9)	0.9 (1.5)	0.3 (1.4)	0.051	1.1 (1.3)	3.3 (3.3)	−2.2 (3.0)	0.042
WLQ Time	9.8 (11.5)	12.5 (15.8)	−2.7 (15.0)	27.1 (24.1)	35.5 (25.8)	−8.3 (24.6)	0.18	21.3 (18.1)	19.6 (23.5)	1.8 (23.9)	0.12	33.8 (20.3)	40.4 (25.5)	−6.6 (22.1)	0.49
WLQ Physical	10.6 (16.2)	13.4 (21.8)	−2.9 (22.5)	22.8 (24.7)	26.6 (24.4)	−3.8 (27.0)	0.75	19.6 (27.6)	18.3 (32.3)	1.4 (43.3)	0.69	39.5 (25.9)	46.3 (26.9)	−6.9 (28.9)	0.42
WLQ Mental	8.5 (10.6)	9.3 (13.0)	−2.1 (12.7)	24.6 (19.3)	29.6 (22.5)	−5.0 (13.3)	0.37	18.9 (16.9)	16.1 (13.3)	2.8 (18.7)	0.11	29.3 (15.6)	27.3 (14.1)	2.0 (12.6)	0.017
WLQ Output	9.7 (12.6)	11.6 (15.6)	−1.9 (15.2)	23.5 (16.2)	31.4 (22.6)	−7.9 (15.1)	0.048	22.4 (19.4)	13.4 (14.1)	9.0 (12.2)	0.006	27.3 (20.5)	33.3 (26.6)	−5.9 (22.7)	0.17
SPS-6	23.7 (4.9)	23.5 (5.1)	−0.2 (5.7)	20.1 (4.9)	18.8 (4.7)	−1.3 (3.8)	0.33	20.7 (5.0)	22.8 (5.6)	2.0 (5.6)	0.033	19.4 (4.5)	18.6 (5.3)	−0.8 (3.0)	0.42

Note: WLQ = Work Limitations Questionnaire, SPS-6 = Stanford Presenteeism Scale. On all measures, a positive change score indicates improvement and a negative change score indicates decline. Direction of effect for SPS-6 has been reversed to be consistent with other measures.

between presenteeism days and inefficiency days is that the latter is adjusted by the individual's percent rating of their productivity on days attending work when unwell, which was 76.8% (s.d.=18.3) for those without depression/anxiety, and 67.8% (s.d.=25.2) for those with depression/anxiety. In adjusted analyses, depression/anxiety was associated with a predicted 0.9 more absenteeism days, 3 presenteeism days, 1 efficiency day, 12–18% more of the time was limited on WLQ subscales, and 4 points worse on the SPS-6 than persons without these disorders. Rescoring a small number of outliers to less extreme values (Tabachnick and Fidell, 1996) produced a negligible change to parameters and no change in conclusions.

Not all presenteeism measures were sensitive to differences in depression severity (see Table 3). This analysis is comparing increases in number of depressive symptoms, with no syndrome reporting a mean of 0.6 symptoms, minor syndrome a mean of 3.0 symptoms, and major syndrome a mean of 6.4 symptoms. Only WLQ Time, Mental and Output showed a pattern of increasing productivity loss as severity of depression increased. No significant differences between no and minor depressive syndrome was observed for absenteeism days, presenteeism days and inefficiency days, while inefficiency days, WLQ Physical, and SPS-6 did not discriminate between minor versus major depressive syndrome. Rescoring of a small number of outliers did not alter conclusions except for inefficiency days, where rescoring three extreme values changed the p value from just above 0.05 to just

below (none versus minor: $B=0.3$, s.e.=0.1, $p=0.032$; minor versus major: $B=1.5$, s.e.=0.5, $p=0.024$).

Syndrome status over time and change in presenteeism and absenteeism is shown in Table 4. Looking firstly at descriptive changes, employees who remained syndrome free at both time points ($N=174$) had either no change in productivity or a slight worsening. Mean scores at both time points showed better functioning than the other groups. Employees who experienced onset of a syndrome ($N=21$) reported worse functioning on all measures. Employees who experienced remission of a syndrome ($N=20$) reported improvements on all measures except absenteeism days, with a similar mean performance at 6 months as the syndrome free group on presenteeism days, WLQ Output, and SPS-6. Employees with a syndrome at both time points ($N=16$) reported worse functioning on all measures except WLQ Mental. Performance at 6 months for this group was especially poor, with an average of 12 presenteeism days, and a third or more of the time affected on WLQ Time, WLQ Physical, and WLQ Output. The linear regression analyses compared change scores across groups with the syndrome free group as referent, and adjusted for covariates and clustering. The onset group reported worse productivity over time on WLQ Output ($B=-5.3$, s.e.=2.3, $p=0.048$), the remitted group reported improved productivity on presenteeism days ($B=3.5$, s.e.=1.0, $p=0.009$), WLQ Output ($B=10.9$, s.e.=3.1, $p=0.006$), and SPS-6 ($B=2.2$, s.e.=0.9, $p=0.033$), while the persisted group reported worse

Table 5

Relationship of specific DSM-IV depression symptoms to work limitations questionnaire subscales at baseline

Predicted difference for presence of each symptom controlling for other symptoms and syndrome severity^a

	WLQ Time			WLQ Physical			WLQ Mental			WLQ Output		
	$N=427$			$N=427$			$N=427$			$N=427$		
	B	Se	p	B	Se	p	B	Se	p	B	Se	p
<i>Cognitive/affect symptoms</i>												
Little interest or pleasure	8.3	2.5	0.010	7.7	4.8	0.14	5.9	2.5	0.040	8.2	2.6	0.012
Feeling depressed/hopeless	-4.6	7.2	0.54	8.2	5.3	0.16	-8.1	6.8	0.26	-2.0	5.7	0.74
Feeling bad about self	7.6	2.4	0.011	6.0	3.1	0.082	10.0	2.3	0.002	6.0	2.7	0.055
Trouble concentrating	9.8	3.6	0.024	3.8	5.2	0.48	13.4	3.7	0.005	8.1	3.6	0.051
Suicidal/self-harm ideation	7.8	4.4	0.11	5.2	6.0	0.41	9.6	2.3	0.003	6.9	3.2	0.056
<i>Physical symptoms</i>												
Sleep disturbance	-2.4	3.3	0.48	1.0	3.3	0.78	-2.6	2.6	0.34	-3.1	2.7	0.28
Tired or little energy	11.0	3.4	0.011	9.2	3.4	0.024	6.4	2.4	0.025	8.6	2.0	0.002
Appetite disturbance	-0.5	2.8	0.87	2.5	3.5	0.48	0.5	1.8	0.78	-1.0	2.0	0.62
Psychomotor disturbance	11.9	4.4	0.024	12.2	4.0	0.013	9.0	5.7	0.15	13.0	3.4	0.004

Note: WLQ = Work Limitations Questionnaire.

^a Adjusted for depressive syndrome status (none, minor, major), gender, age and chronic physical health condition/s. $N=5$ had missing values for one of the covariates and were excluded from the analysis.

productivity on presenteeism days ($B = -6.9$, $s.e. = 1.3$, $p = 0.0004$) and inefficiency days ($B = -2.0$, $s.e. = 0.9$, $p = 0.042$) but improvement in WLQ Mental ($B = 4.7$, $s.e. = 2.9$, $p = 0.017$). Rescoring of a small number of outliers did not alter conclusions.

3.3. Association of individual depressive symptoms with WLQ subscales

The association of the individual depressive symptoms with WLQ subscales is shown in Table 5, with some evidence of specific depressive symptoms having a differential association with different types of job demands. The two significant predictors of WLQ Physical were both physical symptoms, with tired or little energy associated with a 9% increase in amount of time limited in physical work demands, and psychomotor disturbance associated with a 12% increase in amount of time limited. Four of the five cognitive/affective symptoms predicted more time limited on WLQ Mental of between 6–13%, while only one physical symptom was significant (tired or little energy). Symptoms could also be distinguished on their overall importance for predicting presenteeism. Tired or little energy, little interest or pleasure, and psychomotor disturbance were associated with all or most WLQ subscales, while feeling depressed/hopeless, sleep disturbance, and appetite disturbance were not associated with any of the subscales. Rescoring of a small number of outliers did not alter conclusions except for WLQ Output, where rescoring four extreme values changed the p value from just above 0.05 to just below for two symptoms (feeling bad about self: $B = 6.7$, $s.e. = 2.4$, $p = 0.02$; suicidal/self-harm: $B = 6.7$, $s.e. = 2.8$, $p = 0.04$).

4. Discussion

4.1. Overview of study findings

Presenteeism is a relatively new construct used to describe the impact of health problems on productivity when attending work while sick. This study examined the sensitivity of four measures of presenteeism to depression and anxiety in a naturalistic, community-based setting. To our knowledge, this is the one of the first comparative studies of domain-based versus very brief (1 or 2 item) presenteeism measures, and the first to report sensitivity of presenteeism days, inefficiency days, and SPS-6 scores to depression and anxiety assessed with a standardised measure. We did not find that all presenteeism measures provided the same information. While all measures detected worse productivity among employees with

depression or anxiety versus those without depression/anxiety, only the WLQ consistently showed differences in the expected direction for the other comparisons; namely, significant worsening in work productivity as depression severity increased, worsening in productivity in persons who experienced an onset of depression/anxiety, and improvement in productivity in persons who experienced remission of depression/anxiety. There was some evidence of individual depressive symptoms having a differential association with different types of work demands as measured by the WLQ.

4.2. Limitations of the study

This study was conducted in the call centre industry and the findings may not generalise to other occupational settings which have different job demands. While we were unable to compare participants with non-participants at baseline due to anonymity, our sample produced similar findings to previous studies. The prevalence of depressive syndromes was similar to a general Australian community sample that used the PHQ after matching for employment status, age and gender (Goldney et al., 2004). The mean WLQ subscales for major depressive syndrome were within a few percentage points of WLQ scores from an employed sample of persons with PHQ major depressive syndrome recruited from primary care (Lerner et al., 2004a). Comparison data for the other presenteeism measures are not available as these measures have not been used in studies with a standardised measure of mental health. In terms of the whole sample, similar overall mean WLQ subscales were also observed in another sample of call centre agents (Lerner et al., 2003), and SPS-6 overall mean values were similar to clerical workers (Koopman et al., 2002). Of the 432 participants at baseline, the follow-up analysis was restricted to 231 persons due to not providing consent for follow-up ($n = 53$), non-response among those who had consented ($n = 137$), and missing variables ($n = 11$). The 201 non-responders were not more likely to have depression or anxiety than responders but were younger, which was adjusted for in analyses. Finally, we did not have a sufficient sample size to analyse comorbidity between depression and anxiety (Wang et al., 2003).

4.3. Implications

This study does not support the suggestion that assessing presenteeism *per se* may be more important than the particular measure used (Collins et al., 2005), as the presenteeism measures did not provide equivalent information on the association with depression/anxiety.

We found that the WLQ, a domain-based measure of presenteeism, offered significant advantages over briefer measures, and is likely to be an important addition to assessing the magnitude of productivity loss and change over time in persons with depression and anxiety who are working. We largely replicated previous findings from the developer of the WLQ that all the subscales detected worse productivity with greater depression severity, and we extended their findings on the sensitivity of WLQ subscales to individual depressive symptoms (Lerner et al., 2004a). The patterns of association between individual depressive symptoms and the WLQ subscales may offer new evidence to inform early intervention for depression and anxiety in the workplace. The symptom of fatigue interferes with all types of work demands whereas symptoms like feeling bad about self and trouble concentrating predominately limit time job demands such as getting going easily at beginning of workday and sticking to a routine or schedule, and mental job demands such as thinking clearly when working and working without losing train of thought.

In terms of the other study measures, the discrepancy in presenteeism days and inefficiency days highlights the importance of asking about whether attending work when sick actually affected productivity or not. In the whole sample a mean of 3.2 presenteeism days were reported, but this was only equivalent to 0.7 inefficiency days after adjustment for perceived productivity. The SPS-6 discriminated between no and minor depressive syndrome, but not between minor and major depressive syndrome. This may partly be due to the fact that the SPS items are quite similar to depressive symptoms, including hopelessness about finishing tasks, enough energy to complete work, and taking pleasure in work. Persons with sufficient symptoms for a depressive syndrome, whether minor or major, may therefore be likely to endorse most of the SPS items, resulting in similar total scores. An expanded version of the SPS has recently been trialled and may offer greater sensitivity to mental health symptoms (Collins et al., 2005).

This study provides evidence that remission and onset of depression and anxiety had a concurrent and measurable impact on at-work productivity. An especially poor outcome was observed for employees with chronic disorder. Improved recognition and treatment of depression and anxiety in the workforce is essential for both short- and longer-term work capacity, as the associated poorer work performance may contribute to lower job retention and increased job turnover (Lerner et al., 2004b). Further investigation of the costs and outcomes of innovative public health strategies is needed, such as the application of community screening programmes (Greenfield et al., 1997) to the workplace,

and mental health literacy training for employees and managers (Kitchener and Jorm, 2004).

This study supports previous findings that presenteeism is a stronger correlate of depression/anxiety than absenteeism (Aronsson and Gustafsson, 2005; Collins et al., 2005; Stewart et al., 2003), indicating a trend for persons with depression/anxiety to work when sick rather than take time off. There is a small literature on predictors of choosing to work when sick (Dew et al., 2005). Presenteeism is likely to be influenced by internal factors such as stoicism (McKevitt et al., 1997), in addition to external factors such as a workplace culture that discourages sick leave (McKevitt et al., 1997), and the implications of you not turning up for work (i.e. your “replaceability” Aronsson and Gustafsson, 2005). As far as we are aware, there are no studies looking specifically at this “choice” among employees with depression or anxiety. This is a significant question as additional influences may increase pressure for work attendance in persons with depression and anxiety, such as a failure to recognise the decreased productivity as indicative of depression or anxiety, and fear of stigma if reasons for sick leave were to be disclosed (Haslam et al., 2005).

It is important to recognise that while presenteeism is construed as a “hidden” cost of mental disorders, presenteeism may not always be a negative outcome for a particular individual. It may be preferable in both the short- and long-term to continue with the structure of work attendance and (potentially) social support from colleagues, rather than taking a series of short-term work absences which may turn into long-term work absence. For such individuals intervention should therefore focus on improving at-work performance. Appropriate symptom treatment will be a key intervention, but there is also potential for targeting specific deficit areas. For example, a person who wants to continue working, but is experiencing output difficulties, could work with their supervisor to temporarily rearrange their job tasks to suit their abilities until they recover. The routine use of presenteeism measures in clinical and occupational studies will provide this data.

In summary, this study has provided new evidence on the nature of lost work productivity from depression and anxiety. We have shown that the choice of presenteeism measure is important. Researchers or practitioners who are interested in measuring the magnitude of at-work productivity associated with the presence of depression or anxiety could trial any of the measures used here in their own setting, whereas those who are also interested in detecting productivity loss from depression severity, or from changes in symptoms over time, would be advised to consider the Work Limitations Questionnaire.

Acknowledgements

This research was funded by Australian Rotary Health Research Fund Mental Illness Project Grants (2004, 2005). K. Sanderson was supported by a National Health and Medical Research Council Public Health (Australia) Fellowship (ID 290538), and J. Nicholson was supported by a National Health and Medical Research Council Career Development Award (ID 390136). The study procedures were approved by the Queensland University of Technology Human Ethics Committee.

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