

**A STUDY OF THE EFFECTS OF OCCUPATION, AGE, LENGTH
OF SERVICE, SEX, MARITAL STATUS, TYPE OF JOB AND
METHOD OF PAYMENT ON THE NUMBER OF SPELLS
AND DAYS OF ABSENCE TAKEN BY AN EMPLOYEE IN
A HEALTH AUTHORITY.**

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ABSTRACT

The 3,018 persons who were in continuous employment in a Health Authority from April 1974 to March 1976 formed the population for the study of independent variables, metric and non-metric, on the two dependent variables, 'number of spells' and 'days of absence'. The independent metric variables were age and length of service and the non-metric ones were sex, marital status, type of job (full or part-time), method of payment (weekly or monthly).

Because analysis of covariance could not determine whether interactions between metric and non-metric variables or between two metric variables had a significant effect, additional information was obtained from a multiple regression analysis with dummy variables.

In this study, the effect of age on both the indicators of sickness absence (number of spells and days of absence) is not strong. Other variables rarely reached the 5% significance level, suggesting that any such effect is either very slight or may be due to random variations.

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INTRODUCTION

Absence from work is a complex phenomenon which may depend on factors not directly related to illness. These factors may be social^{1,2} may concern the organisations in which people work³, or may be economic, ethnic or personal⁴. A study of sickness absence rates⁵ showed the existence of differences between various groups studied, even after taking into account the effects of age, sex, marital status and type of job. However, differences in sickness absence rates between groups sometimes give a false impression, especially if the values are based on small numbers of employees⁶, and since it is not possible to submit the comparison of sickness absence rates directly to statistical analysis, their interpretation is difficult.

Analysis of covariance was used in this study to examine the effects of the independent variables (age, sex, length of service, marital status, type of job and method of payment) on the dependent variables (total number of spells of absence and total days lost) to show whether or not observed differences were statistically significant.

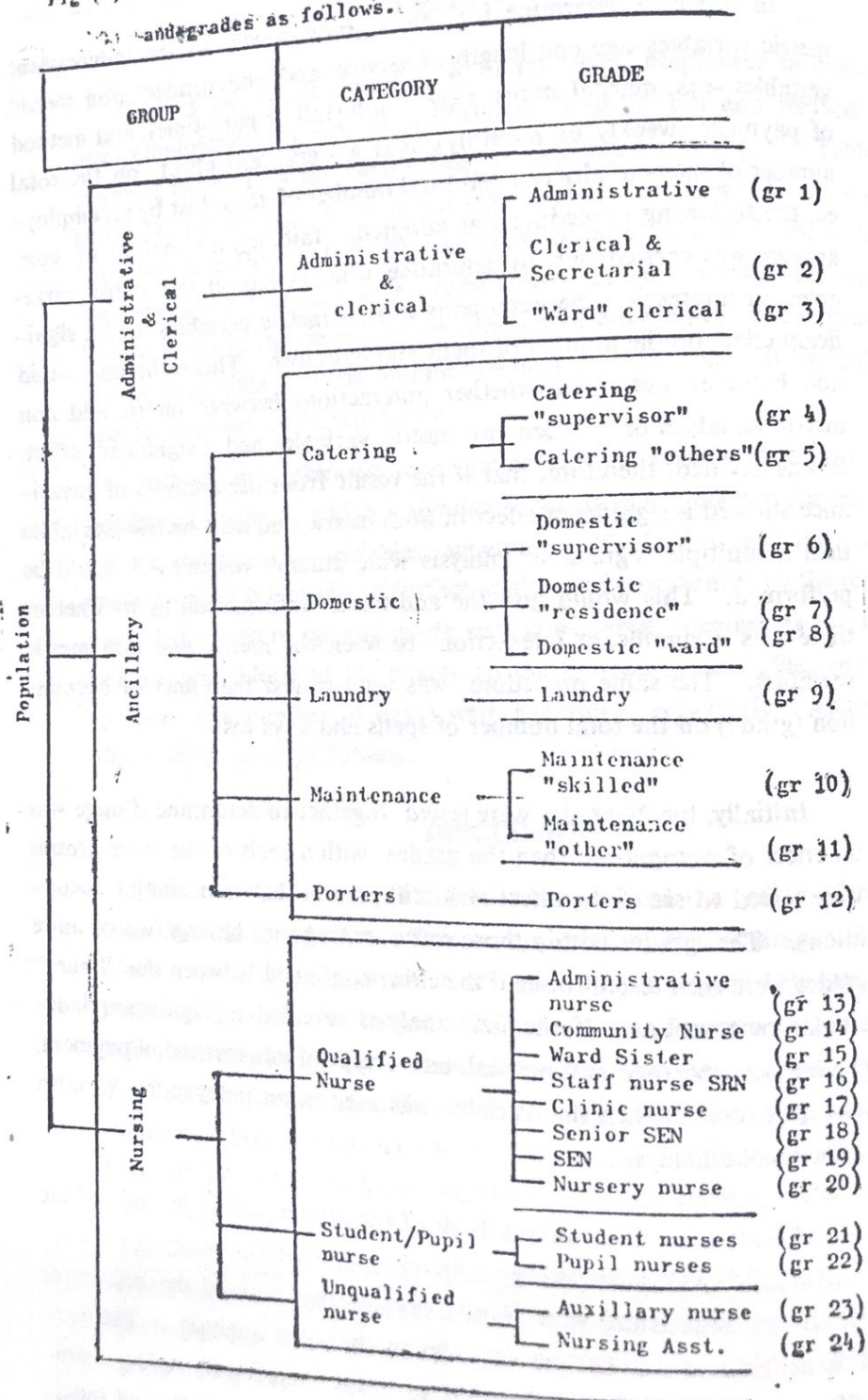
METHOD

The study population comprised those employees (3018) in continuous employment throughout the years April 1974 to March 1976 from the total of 7995 persons who worked for a Health Authority at some time during the two years. There were no significant differences between the two years of the study in respect of the total number of spells of absence and the total number of days lost by the employees⁵. The study population was then classified into three main groups which were subdivided into nine categories of work, each of which was further subdivided into several grades giving a total of 24 grades (see Fig. 1). Each grade was divided into five age groups and each age group divided into male and female. The female employees were further subdivided into female married full-time, female single full-time, female married part-time, female single part-time and female unknown. The male employees were all full-time and were not classified by marital status because for 48% of them this was not known.

A STUDY OF THE EFFECTS OF OCCUPATION

165

Fig (1) Distribution of study population into groups, categories and grades as follows.



In order to determine for each grade which of the independent metric variables—age and length of service, and independent non-metric variables—sex, marital status, type of job (full or part-time), and method of payment (weekly or monthly), had a significant effect on the total number of spells of absence and total number of days lost by an employee, the following procedure was adopted. Initially, an analysis of covariance was carried out, to determine whether any of the metric variables, or interactions between pairs of non-metric variables had a significant effect on the number of spells and days lost. This technique could not, however, determine whether interactions between metric and non-metric variables or between two metric variables had a significant effect. It was decided, therefore, that if the result from the analysis of covariance showed a significant effect in both metric and non-metric variables then a multiple regression analysis with dummy variables^{7,8} would be performed. This would give the additional information as to whether there was a significant interaction between the metric and non-metric variables. The same procedure was used to test the effect of occupation (grade) on the total number of spells and days lost.

Initially, the 24 grades were tested together to determine if there was an effect of occupation, then the grades within each of the three groups were tested to see if the effect was still present between similar occupations. The grades within those seven categories having two or more grades were then tested to see if the effect continued between the "more" similar occupations. If the first analysis revealed a significant independent variable (age, sex, marital status, type of job, method of payment, length of service) then this variable was used as an independent variable in the second analysis.

Although the distributions both of the number of spells and of the number of days lost was skewed, the parametric tests (analysis of covariance and regression) were chosen because they showed the effects of both metric and non-metric variables in the same analysis. The variables were not transformed because Froggatt⁹ had found, using a similar analysis, that this had no important effect on the results and introduced complications in their practical interpretation.

RESULTS

Table 1 shows the distribution of the 3018 employees in continuous employment by sex, marital status, type of job and method of payment for each of the twenty-four grades shown in Fig. 1. Table 2 shows the significance levels of the results of the analyses of covariance and regression for the dependent variable 'number of spells' for each of the independent variables taken separately. Table 3 shows the significance levels of the results of the analyses of covariance and regression for the dependent variable 'number of days lost' for each of the independent variables taken separately.

Both of these tables are then summarised in Table 4 in terms of the number of grades in which a significant result was obtained for each of the six independent variables separately. Table 5 shows the significance levels of the results of further analyses of covariance by the regression method where age and grade were considered together as two independent variables and the effects on the dependent variables (number of spells and number of days) were examined separately. Altogether 196 analyses were performed.

DISCUSSION

Previous studies 11,12,13,14 have emphasised the effect of occupation on sickness absence. This is supported by the findings in table 5 where a highly significant difference ($p < .001$) is shown between the 24 grades of the study for both number of spells and number of days lost. When the employees were considered within the three groups (see Fig. 1) of Administrative, Ancillary and Nursing, the effect of grade on the number of days lost was less marked, being not significant in the first of these groups and less highly significant in the second. The effect of age is highly significant ($P < .001$) for the 24 grades but is not significant for grades within either the Administrative or Ancillary groups. When the grades of any one category were considered the effect of both grade and age was diminished when applied to the number of days lost in that only two of seven categories was grade significant and age was not significant in any of the categories.

Table 1 Distribution of the Employees in Continuous Employment for 1974-76 by Grades and other Variables

Other Variables												
Grade	Sex		Marital Status		Type of Job		Method of Payment		Age in Years		Length of Service	
	Male	Female	Married	Single	Full Time	Part Time	Weekly	Monthly	Median	Range	Median	Range
gr. 1	27	25	34	14	50	2	2	50	48.3	20—59	8.5	2—36
gr. 2	32	285	224	58	190	127	79	238	41.5	18—72	4.5	2—33
gr. 3	—	51	49	2	5	46	42	9	48.0	19—71	7.0	—19
gr. 4	43	19	33	6	57	5	61	1	35.5	18—70	5.2	2—32
gr. 5	32	92	92	16	74	50	124	—	45.0	17—73	5.1	2—26
gr. 6	2	34	31	2	23	13	34	2	43.5	21—64	5.0	2—30
gr. 7	—	137	127	8	36	101	137	—	52.2	23—73	5.3	2—54
gr. 8	6	321	309	12	52	275	326	1	45.	1y—73	4.5	2—46
gr. 9	17	74	57	25	71	20	91	—	50.8	20—64	5.9	2—30
gr. 10	59	—	30	9	59	—	51	8	46.3	22—69	7.0	2—30
gr. 11	65	£—	38	7	65	—	64	1	53.3	18—64	6.9	2—30
gr. 12	93	—	52	12	93	—	91	2	50.7	21—63	5.8	—29
gr. 13	25	44	26	18	67	2	2	67	45.0	2y—68	12.3	2—41
gr. 14	—	126	106	20	114	12	2	124	39.5	22—62	7.1	2—30
gr. 15	76	211	151	66	228	59	155	132	35.4	2.—68	5.8	2—51
gr. 16	18	102	85	15	43	77	94	26	35.8	20—66	4.1	2—29
gr. 17	—	25	22	3	5	20	11	14	43.3	26—60	4.4	2—27
gr. 18	10	15	9	4	25	—	21	4	48.0	2p—62	13.6	3—29
gr. 19	25	235	192	29	122	138	214	46	44.5	10—64	6.6	2—37
gr. 20	—	10	8	2	1	9	9	1	32.5	20—55	4.2	2—10
gr. 21	7	114	3	118	121	—	1	120	19.4	18—40	2.9	2— 4
gr. 22	—	10	—	10	10	—	—	10	33.0	18—43	2.3	2— 3
gr. 23	4	329	303	30	70	263	292	41	41.5	18—65	4.5	2—23
gr. 24	4	214	164	10	43	175	216	2	37.3	18—62	4.2	2—35
Total	545	2473	2145	496	1624	1394	2119	899	42.3	16..73	5.0	—54
Total	(3018)		2641		(3018)		30.18					
Missing Value			378									
Total	3018		3018		3018		3018					

(—) No Employees

A STUDY OF THE EFFECTS OF OCCUPATION

169

Table 2 The Significance Values ($p < 0.05$) derived from the Analysis of covariance and regression for the effect of any one independent variable (age, length of service, sex, marital status, type of job and method of payment on total number of spells for each grade.

Grade	No. of Employees	Significance value of independent variables					
		Age	Length of service	sex	Marital status	Type of job	Method of payment
gr. 1	52	n.s	n.s	(b)	n.s	—	—
gr. 2	318	(d)	n.s	(a)	n.s	(b)	(c)
gr. 3	51	n.s	n.s	—	—	—	n.s
gr. 4	62	n.s	n.s	n.s	n.s	—	—
gr. 5	12n	n.s	n.s	n.s	(a)	n.s	—
gr. 6	36	n.s	n.s	—	—	n.s	—
gr. 7	138	(c)	n.s	—	n.s	n.s	—
gr. 8	328	(c)	(d)	n.s	(a)	n.s	—
gr. 9	91	(b)	n.s	n.s	n.s	n.s	—
gr. 10	50	n.s	n.s	—	n.s	—	n.s
gr. 11	65	(c)	n.s	—	n.s	—	—
gr. 12	93	n.s	n.s	—	n.s	—	—
gr. 13	60	(b)	n.s	n.s	n.s	—	—
gr. 14	126	n.s	n.s	—	n.s	—	—
gr. 15	288	n.s	n.s	n.s	n.s	n.s	—
gr. 16	120	(b)	n.s	n.s	n.s	n.s	n.s
gr. 17	25	n.s	n.s	—	—	n.s	n.s
gr. 18	25	n.s	n.s	—	—	n.s	n.s
gr. 19	260	(d)	n.s	n.s	—	—	—
gr. 20	10	n.s	n.s	n.s	n.s	n.s	n.s
gr. 21	121	n.s	n.s	—	—	—	—
gr. 22	10	n.s	n.s	n.s	—	—	—
gr. 23	333	(d)	n.s	—	—	—	—
gr. 24	218	(a)	n.s	—	n.s	n.s	n.s
Number of grades suitable to test		2n	2n	12	18	13	8

n.s. Not Significant

(a) > 0.05 $p > 0.02$ (c) > 0.01 $p > 0.001$ (b) $0.02 > p > 0.01$ (d) $p < 0.001$

(—) This variable was not used in the analysis for that particular grade

Table 3

The Significance Value [†] ($p < 0.05$) derived from the analysis of convariance and regression for the effect of any one independent variable (age, length of service, sex, marital status, type of job and method of payment on total number of days lost for each grade.

Grade	No. of Employees	Significance value of Independent Variables					
		Age	Length of service	Sex	Marital Status	Type of Job	Method of Payment
gr. 1	52	n.s	n.s	n.s	n.s	—	—
gr. 2	318	n.s	n.s	n.s	n.s	n.s	(a)
gr. 3	51	n.s	n.s	—	—	—	n.s
gr. 4	62	(c)	n.s	n.s	n.s	—	—
gr. 5	124	n.s	n.s	n.s	n.s	n.s	—
gr. 6	36	n.s	n.s	—	—	n.s	—
gr. 7	137	n.s	n.s	—	n.s	n.s	—
gr. 8	327	n.s	n.s	n.s	(a)	n.s	—
gr. 9	91	n.s	(c)	n.s	(b)	n.s	—
gr. 10	59	n.s	n.s	—	n.s	—	n.s
gr. 11	65	n.s	n.s	—	n.s	—	—
gr. 12	93	n.s	n.s	—	n.s	—	—
gr. 13	69	n.s	n.s	n.s	n.s	—	—
gr. 14	126	n.s	n.s	—	n.s	n.s	—
gr. 15	287	n.s	n.s	n.s	(a)	n.s	n.s
gr. 16	120	n.s	n.s	n.s	n.s	n.s	n.s
gr. 17	25	(b)	n.s	—	—	n.s	n.s
gr. 18	25	n.s	n.s	n.s	—	—	—
gr. 19	260	n.s	n.s	n.s	n.s	n.s	n.s
gr. 20	10	n.s	n.s	—	—	—	—
gr. 21	121	n.s	n.s	n.s	—	—	—
gr. 22	10	n.s	n.s	—	—	—	—
gr. 23	333	n.s	n.s	—	n.s	n.s	n.s
gr. 24	218	n.s	n.s	—	n.s	n.s	—
Number of grades							
Suitable To test		24	24	12	18	13	8

n.s

(a)

(c)

(—)

Not Significant

0.05 > p > 0.02

0.01 > p > 0.001

(b)

0.02 > p > 0.01

(d)

p < 0.001

This variable was not used in the analysis for that particular grade.

376

A STUDY OF THE EFFECTS OF OCCUPATION

171

Table 4

Number of grades with significant ($p < 0.05$) effects between dependent variables
(number of spells, number of days lost) and independent variables

Independent Variables	Number of Grades Tested	Dependent Variables	
		Total No. of spells	Total No. of days lost
Age	2n	10	2
Length of Service	24	1	1
Sex	12	2	0
Marital Status	17	2	3
Type of Job	13	1	0
Method of Payment	8	1	1

Table 5

Significance Values from Analysis of Covariance for Effect of Independent Variables (Grade and Age) on Dependent Variables (Number of Spells and Number of Days Lost)

Independent Variables	Dependent Variables	
	No. of Spells	No. of Days lost
<i>Between the 24 grades :</i>		
24 grades together	d	d
Age	d	d
<i>Between the grades of one group :</i>		
Administrative & clerical (3 grades together)	c	c
Age	d	n.s
Ancillary (9 grades together)	d	c
Age	d	n.s
Nursing (12 grades together)	d	d
Age	d	d
<i>Between the grades of one category :</i>		
Administrative & clerical (3 grades together)	c	n.s
Age	d	n.s
Catering (2 grades together)	a	n.s
Age	c	n.s
Domestic (3 grades together)	c	c
Age	d	n.s
Maintenance (2 grades together)	b	n.s
Age	c	n.s
Qualified nurses (8 grades together)	d	n.s
Age	d	n.s
Student/pupil nurses (2 grades together)	n.s	n.s
Age	a	n.s
Unqualified nurses (2 grades together)	n.s	a
Age	d	n.s

n.s = not significant

a = $0.05 > p > 0.02$

b = $0.02 > p > 0.01$

c = $0.01 > p > 0.001$

d = $P < 0.001$

When the grades of any one category were considered for the number of spells, two of the comparisons were not significant although all were significant for age. However, the levels of significance were not as high as when all grades were combined together. Tables 2 and 3 show quite clearly that age has, in fact, a fairly weak effect on sickness absence because, when individual grades are examined, the effect of age is significant in only 10 out of 24 grades for number of spells, and in only two grades for number of days lost. In all cases the association was negative implying the younger the employee the higher the number of spells. The effects of length of service, sex, marital status, are even weaker, with few of the grade having shown any statistical significance. In fact, out of 48 comparisons only 12 showed significant results.

The performance of relatively large numbers of statistical tests increases the likelihood of a significant result due to random variation alone. Under these circumstances a more stringent level of significance is recommended. Even the fairly modest change of the level of significance to 0.01 would have the effect of removing from Table 4 the effects of sex, marital status and type of job, leaving only three significant analyses, and reducing to 6 + 1 the effect of age.

CONCLUSIONS

These findings suggest that the effect of age on sickness absence is not as strong as had been thought from earlier studies. Froggatt¹⁰, using a similar analysis, also showed a negative but weak association between sickness absence and age. Other variables such as length of service, sex, marital status, type of job and method of payment rarely reached the 5% significance level suggesting that any such effect is very slight or may be due to random variation.

This paper is based on a thesis submitted by one of us (H.J.J.) for the degree of Ph. the University of Manchester.

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