Factors that Influence Sick Leave Use

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ABSTRACT
This paper sets out to identify and explore factors associated with sick leave use. The paper considers position category (academic/general), sick leave type, age, gender, salary and length of service. The paper also looks at other factors such as the day of the week and month. Both the frequency and length of sick leave use are considered. The analysis suggests that most of these factors affect sick leave use, in particular position category and gender.

INTRODUCTION

1. Background
Increasingly the “health” aspect of occupational health and safety is being recognised through the growth in health and well being programs. One of the common claims of these programs is the reduction in sickness rates either directly through improved staff health or indirectly through improved morale and commitment. This paper provides a foundation to these programs by identifying and examining some of the factors influencing sick leave use.

2. Data Analysis
The data used for analysis in this paper was full-time equivalent sick leave data for 2008. This consisted of 1904 staff employed for the full year with 7804 leave entries. Some initial manipulation of the data needed to occur to address the following issues:
   • full time staff with multiple positions and classifications
   • multiple leave entries for a continuous period of leave.

A variety of statistical tools were used in the analysis. These included the Chi Square statistic, the Kruskal-Wallis test statistic and the Wilcoxon Rank Sum Test. The 95% statistic was used as the test point for accepting or rejecting the hypothesis.

In order to allow the comparison of data between groups, the data was standardised by using a rate per staff member: for example, single day absences per staff member.

Sick leave data can be analysed in three main ways:
   • the percentage of staff using or not using sick leave
   • the frequency of sick leave use (leave entries per staff member)
   • the total amount of sick leave used (days lost per leave entry or days lost per staff member).

Please note, in the findings the following abbreviations are used in the figures: A = Academic staff, G= General staff, F = female, M = male
3. **Overall Trends in Sick Leave Use**

3.1 **Analysis of Sick Leave Use by Month**

A number of studies have shown a significant gender difference in sick leave use (Kroesser et al, 1991; Adams and Cowen, 2004). However, one study indicated that, although there is a gender difference for single day absences, this difference disappears as the length of leave increases (Laaksonen et al, 2007). In this study, analysis of monthly data indicates no statistical differences between male and female general staff for single day absences in contrast to all absences. Overall monthly sick leave seems to peak in August-September.

<table>
<thead>
<tr>
<th>Category</th>
<th>All Absences</th>
<th>Single Day Absences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Academic</td>
<td>there is a statistical difference (ChiSq = 100%) between male and female General staff (Error! Reference source not found.)</td>
<td>there is no statistical difference (ChiSq = 44%) between male and female General staff (Error! Reference source not found.)</td>
</tr>
<tr>
<td>General</td>
<td>there is a statistical difference (ChiSq = 100%) between male and female Academic staff (Error! Reference source not found.)</td>
<td>there is a statistical difference (ChiSq = 100%) between male and female Academic staff (Error! Reference source not found.)</td>
</tr>
<tr>
<td>Research</td>
<td>there is a statistical difference (ChiSq = 99%) between male and female Research staff (not shown)</td>
<td>there is no statistical difference (ChiSq = 29%) between male and female Research staff (not shown)</td>
</tr>
</tbody>
</table>

![Figure 1: Total Absences by Month](image1)

![Figure 2: Single Day Absences by Month](image2)
3.2 Analysis of Sick Leave Use by Day of the Week

Using leave entries for 2008, any differences in sick leave use during the work week can be explored. Some studies have previously indicated that Monday had a much higher level of sick leave use compared to other days of the week (Burger van Eeden and Jordaan, 2008).

Superficially it would appear from the data that Monday has a 25% higher absence rate than other days (Error! Reference source not found.). However, the calculation needs to take into account weekends. The following is based on the hypothesis that a staff member has an equal probability of being sick on any day of the week. For example a single day absence on a Monday may mean the person has been sick 1 day (Monday), 2 days (Sunday and Monday) or 3 days (Saturday, Sunday and Monday). Using this approach, Error! Reference source not found. can be calculated.

<table>
<thead>
<tr>
<th>Start Day</th>
<th>Half day</th>
<th>1 day</th>
<th>2 days</th>
<th>3 days</th>
<th>4 days</th>
<th>5 days</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday</td>
<td>½</td>
<td>1+2+3</td>
<td>2+3+4</td>
<td>3+4+5</td>
<td>4+5+6</td>
<td>5+6+7+8+9</td>
</tr>
<tr>
<td>Tuesday</td>
<td>½</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4+5+6</td>
<td>7</td>
</tr>
<tr>
<td>Wednesday</td>
<td>½</td>
<td>1</td>
<td>2</td>
<td>3+4+5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Thursday</td>
<td>½</td>
<td>1</td>
<td>2+3+4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Friday</td>
<td>½</td>
<td>1+2+3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
</tbody>
</table>

Figure 3: Expected Days of Sick Leave

Using the actual data contained in Error! Reference source not found., the expected number of entries can be calculated. For example the average of the one day entries for Tuesday to Thursday (862, 869, 874 entries) can be used to calculate the expected one day number of entries (868 entries). In turn a ratio of expected to actual can be calculated: in Error! Reference source not found.. For example with 1 day absences on a Monday, the expected number of entries would be 868 (1 day) + 164 (2 days) + 68 (3 days) = 1100 versus the actual number of 1085, a ratio of 0.99.

<table>
<thead>
<tr>
<th>Start Day</th>
<th>half day</th>
<th>1 day</th>
<th>2 days</th>
<th>3 days</th>
<th>4 days</th>
<th>5 days</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday</td>
<td>98</td>
<td>1085</td>
<td>250</td>
<td>107</td>
<td>36</td>
<td>82</td>
</tr>
<tr>
<td>Tuesday</td>
<td>104</td>
<td>862</td>
<td>156</td>
<td>68</td>
<td>55</td>
<td>17</td>
</tr>
<tr>
<td>Wednesday</td>
<td>107</td>
<td>869</td>
<td>171</td>
<td>138</td>
<td>18</td>
<td>6</td>
</tr>
<tr>
<td>Thursday</td>
<td>111</td>
<td>874</td>
<td>246</td>
<td>39</td>
<td>14</td>
<td>12</td>
</tr>
<tr>
<td>Friday</td>
<td>101</td>
<td>874</td>
<td>26</td>
<td>15</td>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td>Expected no. of entries</td>
<td>104</td>
<td>868</td>
<td>164</td>
<td>68</td>
<td>26</td>
<td>27</td>
</tr>
<tr>
<td>% of Total 1-5 days</td>
<td>75.3%</td>
<td>14.2%</td>
<td>5.9%</td>
<td>2.3%</td>
<td>2.3%</td>
<td></td>
</tr>
</tbody>
</table>

Figure 4: Number of Sick Leave Entries of 1-5 days
The resulting analysis in Error! Reference source not found. indicates the following below.

- For 1 and 2 days leave, the proposition of equal probability of leave on any day of the week is supported overall. This is further supported by the half day leave data. There is no indication that Mondays have higher than expected levels of sick leave use except for week (5 day) absences.
- Fridays have a much lower than expected level of single day sick leave use.

### 3.3 Normal and Family (Carer’s Leave) Sick Leave Use
There are two types of sick leave used by staff: normal sick leave and family (or carer’s) sick leave.
There are quite different trends between age groups, leave type and gender. In general with normal sick leave, younger age groups take leave more frequently.

Although male staff have often longer periods of sick leave, the lower male frequency rate of sick leave use means that overall, female staff use more sick leave: academic (56% more), general (10% more) and research staff (46% more).

<table>
<thead>
<tr>
<th>Duration of Sick Leave Use ()</th>
</tr>
</thead>
<tbody>
<tr>
<td>Category</td>
</tr>
<tr>
<td>Academic</td>
</tr>
<tr>
<td>Academic</td>
</tr>
<tr>
<td>General</td>
</tr>
<tr>
<td>General</td>
</tr>
</tbody>
</table>

3.4 Staff Not Using Sick Leave
In general, the percentage of staff using no leave during the year increases with age except with female general staff (Error! Reference source not found.). For length of service and salary there are no particular trends except for female academics where the number of staff using no leave increases with length of service.
4. **Analysis of Sick Leave Use by Population Characteristics**

4.1 **Position Category and Gender**

Although there is no statistical difference between normal and family leave for categories of staff taking leave, in each individual category there is a statistically significant difference due to gender (Error! Not a valid bookmark self-reference.). The data was also tested using the Wilcoxon Rank Sum Test and the Kruskal-Wallis Test with similar results for academic and general staff (Error! Reference source not found.).

<table>
<thead>
<tr>
<th>Hypothesis: Ho: Observed distribution is the same as the population distribution</th>
<th>$\chi^2$</th>
<th>$\chi^2_{.05}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>For staff taking sick leave, there is no difference between family and normal leave use for academic, general or research staff</td>
<td>48.9%</td>
<td>Accept</td>
</tr>
<tr>
<td>For staff taking sick leave, there is no difference between family and normal leave use for female and male academic staff</td>
<td>94.3%</td>
<td>Accept</td>
</tr>
<tr>
<td>For staff taking sick leave, there is no difference between family and normal leave use for female and male general staff</td>
<td>99.6%</td>
<td>Reject</td>
</tr>
<tr>
<td>For staff taking sick leave, there is no difference between family and normal leave use for female and male research staff</td>
<td>95.9%</td>
<td>Reject</td>
</tr>
<tr>
<td>For all staff, there is no difference between family and normal leave use for academic, general or research staff</td>
<td>100.0%</td>
<td>Reject</td>
</tr>
<tr>
<td>For all staff, there is no difference between family and normal leave use for female and male academic staff</td>
<td>100.0%</td>
<td>Reject</td>
</tr>
<tr>
<td>For all staff, there is no difference between family and normal leave use for female and male general staff</td>
<td>100.0%</td>
<td>Reject</td>
</tr>
<tr>
<td>For all staff, there is no difference between family and normal leave use for female and male research staff</td>
<td>100.0%</td>
<td>Reject</td>
</tr>
</tbody>
</table>

*Figure 9: Chi-Square Tests ($\chi^2$) for Position Category and Gender*
### Frequency of Sick Leave use

<table>
<thead>
<tr>
<th>Group</th>
<th>Gender</th>
<th>Wilcoxon Rank Sum Test</th>
<th>Kruskal-Wallis Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Academic</td>
<td>Female</td>
<td>100% probability that there is a difference with females having a higher frequency of sick leave use</td>
<td>100% probability that there is a difference with females having a higher frequency of sick leave use</td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td></td>
<td></td>
</tr>
<tr>
<td>General</td>
<td>Female</td>
<td>99.7% probability that there is a difference with females having a higher frequency of sick leave use</td>
<td>99.2% probability that there is a difference with females having a higher frequency of sick leave use</td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Research</td>
<td>Female</td>
<td>88% probability that there is a difference. At the 95% level, there is no statistically significant difference in the frequency of sick leave use</td>
<td>Not calculable</td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 10: Rank Tests for Position Category and Gender

### Total Amount of Sick Leave used

<table>
<thead>
<tr>
<th>Group</th>
<th>Gender</th>
<th>Wilcoxon Rank Sum Test</th>
<th>Kruskal-Wallis Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Academic</td>
<td>Female</td>
<td>100% probability that there is a difference with females using a larger amount of sick leave</td>
<td>100% probability that there is a difference with females using a larger amount of sick leave</td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td></td>
<td></td>
</tr>
<tr>
<td>General</td>
<td>Female</td>
<td>99.9% probability that there is a difference with females using a larger amount of sick leave</td>
<td>99.7% probability that there is a difference with females using a larger amount of sick leave</td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Research</td>
<td>Female</td>
<td>93% probability that there is a difference. At the 95% level, there is no statistically significant difference in the amount of sick leave used</td>
<td>Not calculable</td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4.2 **Position Category, Gender and Age**
This has been discussed in section 3.3 above.

4.3 **Position Category, Gender and Income**
A study on U.S. teachers found that, amongst other factors, salary is a major variable in sick leave use (Kroesser et al, 1991). The current study supports a relationship between salary and sick leave use only for general staff.

<table>
<thead>
<tr>
<th>Category</th>
<th>Gender</th>
<th>Leave Frequency ()</th>
<th>Amount of Leave ()</th>
</tr>
</thead>
<tbody>
<tr>
<td>Academic</td>
<td>Female</td>
<td>Relatively stable over all salaries</td>
<td>Fluctuates with salary</td>
</tr>
<tr>
<td>Academic</td>
<td>Male</td>
<td>Relatively stable over all salaries</td>
<td>Fluctuates with salary</td>
</tr>
<tr>
<td>General</td>
<td>Female</td>
<td>Decreases with salary</td>
<td>Decreases with salary</td>
</tr>
<tr>
<td>General</td>
<td>Male</td>
<td>Increases to $60-69K then decreases with salary</td>
<td>Decreases with salary</td>
</tr>
</tbody>
</table>
Overall there is no clear link between length of service and sick leave.

**CONCLUSION**

There are significant differences in sick leave patterns between females and males, and between academic and general staff. In terms of normal sick leave use the sequence is from most to least:

female general > male general > female academic > male academic

Sick leave use fluctuates over the course of the year. For both general and academic staff sick leave use peaks in August - September.
Except for Fridays, sick leave use over the days of the week is consistent with no particular day being favoured. On Fridays there is a significantly lower level of sick leave use than expected.

A closer analysis of the data by sick leave type (family or carers leave and normal sick leave), age, length of service and salary reveals more complex patterns. Overall, for staff who take leave there is no statistical difference between family leave use and normal sick leave use between academic, general and research staff. For each group approximately 17% of sick leave use is family leave. However, there is a statistically significant difference in leave type use between male and female general and research staff with males taking a higher proportion of family leave.

In general, normal sick leave use decreases with age. The duration of sick leave with age has a much more varied pattern with males in the 50-59 age group having a noticeably higher average duration of sick leave compared to female staff. However, because of the higher frequency of female sick leave use, overall, male staff take less sick leave than female staff.

For general staff, sick leave use decreases with increasing salary both in terms of frequency and duration. The situation with academic staff is more varied. Overall length of service does not appear to affect sick leave use significantly.

REFERENCES