Shiftwork experience and the value of time

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Keywords: Shiftwork; Time; Preference; Age and experience.

Dissatisfaction with shiftwork has been shown to increase with age and work experience. The objective was to determine if differences in preferred paid work time existed between shiftworkers with different lengths of shiftwork experience and age-matched non-shiftworkers (controls). A questionnaire was used to determine how controls and shiftworkers with different shiftwork experience perceived the value of preferred work time across the week. Participants were required to value each hour across the days of the week on a scale from 0 (least preference) to 10 (highest preference). Data were analysed across groups to produce mean and standard deviation matrices. Unpaired t-tests determined significant differences between groups. This study found that preferred hours-of-work change with years of shiftwork experience. For shiftworkers in their first 5 years and those in their 30th-year-plus of shiftwork, night work was a low priority. Shiftworkers with 17–30 years experience indicated a preference for work any time across the week. Overall, shiftworkers extended their preferred work hours to include the evenings and weekend. Controls adhered more strongly to current societal norms. The results suggest that a person initially undertaking shiftwork may well be one with a less restrictive perception of time and its use, however, this perception may alter over time.

1. Introduction

In general work experience increases with age. As individuals age and their life phase changes they may have dependents and parenting responsibilities (children, partner, older parents, relatives), financial commitments, physical difficulties or problems (e.g. sleep disturbances, dietary requirements, hormonal changes) and work responsibilities that they did not necessarily have when they originally commenced work (Rutenfranz et al. 1985, Knauth and Costa 1996). These factors influence an individual’s life and ultimately the way they prioritize activities (De La Mare and Walker 1968, Argyle 1996).

The effects of shiftwork on workers, their families, communities and organizations have been well-documented (Mott et al. 1965, Wedderburn 1967, Rutenfranz and Knauth 1976, Baker 1980, Gadbois 1981, Iskra-Golec et al. 1996, Akerstedt 1998, Nurminen 1998, Nachreiner 1998, Barton et al. 1998). Generally, there is agreement among researchers that the effects on ‘well being and health are chronic’ (Rutenfranz...
et al. 1985: 203) and that this is related to the age of the worker and the number of years the worker has been exposed to shiftwork.

Many people avoid shiftwork altogether (Akerstedt and Knutsson 1997) or are screened out by medical officers prior to commencement (Haider et al. 1981). In addition, for those who commence shiftwork, the self-selection process takes place within the first 10 years (Rutenfranz et al. 1985, Quinlan and Bohle 1991) with about 20% of shiftworkers leaving shiftwork after a very short time (Costa 1996). Overall, many shiftworkers dislike their hours-of-work and if all things were equal many would leave shiftwork (Hakkinen 1969, Oginska et al. 1993). This aversion to shiftwork has been associated with the strain of night work, health concerns, disruption to family and social life and management problems within the workplace (Kogi 1985).

However, researchers have suggested that the first 5 years of shiftwork are an adaptation phase, where the worker adjusts to the new working time arrangements and makes allowances for family and social change (Rutenfranz et al. 1985). In addition, during this first 5 years Kundi et al. (1979) found that shiftwork had its strongest effect on subjective well being and health.

Rutenfranz et al. (1985) described all the phases an individual goes through during their shiftworking lifetime. During the period of time from the 5th to the 20th year, referred to as the sensitization phase, the worker aims to improve both family and work conditions. From the 20th to the 40th year, known as the accumulation phase, family, social and financial situations are said to remain fairly constant or improve. It is during the last or manifestation phase where health-related problems become more obvious to the shiftworker.

Shiftworkers have been shown to value time similarly to day workers (Blakelock 1960, Wedderburn 1981, Hornberger and Knauth 1993); thus their attempt to adhere to societal norms may influence the degree of dissatisfaction they experience and this increases with age (Anderson 1970). However, in contrast De La Mare and Walker (1968) found that satisfaction with a shift system increased the longer it had been experienced. They suggested that habit was an important determinant of preference for a shift roster and hence job satisfaction. However, they point out that employees can override their ‘old habits’ when events such as marriage, dependents or financial need present themselves.

This study aimed to determine if differences in preferred paid work time existed between shiftworkers with different lengths of shiftwork experience and age-matched non-shiftworkers (controls).

2. Methodology

Seven hundred and sixty three shiftworkers and 110 non-shiftworkers (controls) were involved in the study. Shiftworkers were drawn from occupations including nursing, police force, train controllers, mining, truck driving, hospitality and power generation. Control participants were recruited from rail organizations, teaching, academia, banking, security, medical services and hospitality. Shiftworkers were divided into six separate groups representing years of shiftwork experience. Individuals in all groups were age-matched with individuals from the control group. Shiftwork experience ranged from 3 weeks to 38 years. Groups represented employees with 0–5 years, 5–10 years, 10–17 years, 17–23 years, 23–30 years and 30–38 years of shiftwork experience. All participants completed a preferred working time matrix (Baker et al. 2003a,b) and demographic questionnaire. The preferred working time matrix required participants to provide a value for each hour.
of the day across the 7 days of the week on a scale from 0 (least preference) to 10 (highest preference). Data from the preferred working time matrices were analyzed across participants to produce separate mean and standard deviation matrices for each hours of the week, thereby producing a mean matrix for each experience group.

2.1. Comparison of different experience groups
Refer to Baker et al. (2003a,b) for further details on the matrix and analysis. Significance was imposed at \( p < 0.01 \), with a further requirement of at least two contiguous cells, either vertical or horizontal, to be considered. \( t \)-tests were employed to provide comparisons across the hours of the day, for each day of the week, for each key area to determine significant differences between groups. \( p \)-values are quoted for periods of the week in which the responses were significantly different between shiftworkers and control groups. Thus, for each significant \( p \)-value a \( t \)-value threshold is also cited.

3. Results
Of the 763 shiftworkers who completed the matrix only 450 individuals were used in this study due to the age-matched criteria (refer to table 1 for summary of shiftwork groups). The aged-matched controls were selected from a group of 110 non-shiftworkers (refer to table 2 for summary of control groups). The number of shiftworkers was limited by the availability of age-matched controls, at no time could any group exceed 110 participants.

3.1. 0–5 years shiftwork experience
The 87 shiftworkers in this group had been shiftworkers for less than 5 years. Shiftwork experience ranged from 3 weeks to 4.9 years, with a mean of \( 2.3 \pm 1.4 \) years. These workers had a mean age of \( 34.0 \pm 9.0 \) years. Aged-matched controls had a mean age of \( 35.0 \pm 9.0 \) years.

The shiftworkers’ peak work value was the same as that of the age-matched controls, 7.0–8.0. Compared with age-matched controls, shiftworkers with 0–5 years experience indicated a significantly higher preference for work time early in the morning and at night Monday to Friday and during the day over the weekend \(( p < 0.01, \ t_{172} < -2.647)\) (figure 1).

Table 1. Characteristics of shiftworkers in each of the six different groups representing years of shiftwork experience.

<table>
<thead>
<tr>
<th></th>
<th>0–5 years</th>
<th>5–10 years</th>
<th>10–17 years</th>
<th>17–23 years</th>
<th>23–30 years</th>
<th>30–38 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>87</td>
<td>95</td>
<td>104</td>
<td>80</td>
<td>56</td>
<td>28</td>
</tr>
<tr>
<td>Mean age (years)</td>
<td>( 34 \pm 9 )</td>
<td>( 36 \pm 10 )</td>
<td>( 38 \pm 9 )</td>
<td>( 41 \pm 7 )</td>
<td>( 45 \pm 5 )</td>
<td>( 51 \pm 3 )</td>
</tr>
<tr>
<td>Mean experience (years)</td>
<td>( 2.3 \pm 1.4 )</td>
<td>( 7.0 \pm 1.3 )</td>
<td>( 12.6 \pm 2.2 )</td>
<td>( 18.8 \pm 1.5 )</td>
<td>( 25.0 \pm 1.8 )</td>
<td>( 33.8 \pm 2.5 )</td>
</tr>
<tr>
<td>Male</td>
<td>67</td>
<td>72</td>
<td>71</td>
<td>64</td>
<td>50</td>
<td>26</td>
</tr>
<tr>
<td>Female</td>
<td>20</td>
<td>23</td>
<td>33</td>
<td>16</td>
<td>6</td>
<td>2</td>
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<td>38</td>
<td>61</td>
<td>60</td>
<td>42</td>
<td>24</td>
</tr>
<tr>
<td>No children</td>
<td>48</td>
<td>55</td>
<td>40</td>
<td>18</td>
<td>12</td>
<td>2</td>
</tr>
<tr>
<td>Partners</td>
<td>58</td>
<td>67</td>
<td>74</td>
<td>63</td>
<td>44</td>
<td>24</td>
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<tr>
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<td>44</td>
<td>43</td>
<td>18</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>( &gt; 35)yrs old</td>
<td>35</td>
<td>51</td>
<td>61</td>
<td>62</td>
<td>56</td>
<td>28</td>
</tr>
</tbody>
</table>
3.2. 5–10 years shiftwork experience

The 95 shiftworkers in this group had been shiftworkers equal to or greater than 5 years and less than 10 years. Shiftwork experience ranged from 5 years to 9.6 years, with a mean of 7.0 ± 1.3 years. These workers had a mean age of 36 ± 10 years. Age-matched controls had the same mean age of 36 ± 10 years.

Shiftworkers demonstrated their peak preference for paid work time, valued at 5.0–6.0, from 0800 h to 1500 h Monday, Wednesday, Thursday and Friday, and 0800 h to 1600 h Tuesday.

Compared with controls, shiftworkers with 5–10 years experience indicated a significantly higher preference for work in the early mornings Thursday and Friday and late in the evening Tuesday to Saturday (p < 0.01, t188 < −2.635). Compared with shiftworkers with 5–10 years experience, controls indicated a significantly
higher preference for work in the middle of the day Monday to Thursday ($p < 0.01$, $t_{188} > 2.612$) (figure 2).

3.3. 10–17 years shiftwork experience
The 104 shiftworkers in this group had been shiftworkers equal to or greater than 10 years and less than 17 years. Shiftwork experience ranged from 10 years to 16.5 years, with a mean of $12.6 \pm 2.2$ years. These workers had a mean age of $38 \pm 9$ years. Age-matched controls had the same mean age of $38 \pm 9$ years.

Shiftworkers indicated that their peak preferred paid work times valued at 6.0–7.0 were from 0800 h to 1500 h Monday and Tuesday, 0900 h to 1500 h Wednesday and Thursday and 0900 h to 1300 h Friday.

Compared with controls, shiftworkers with 10–17 years experience indicated a significantly higher preference for work in the early mornings and evenings Monday to Friday and over the weekend ($p < 0.01$, $t_{206} < -2.060$) (figure 3).

3.4. 17–23 years shiftwork experience
The 80 shiftworkers in this group had been shiftworkers equal to or greater than 17 years and less than 23 years. Shiftwork experience ranged from 17 years to 22 years, with a mean of $18.8 \pm 1.5$ years. These workers had a mean age of $41 \pm 7$ years. Age-matched controls had the same mean age of $41 \pm 7$ years.

These shiftworkers preferred to work at any time across the week; however, their peak preferred hours valued at 6.0–7.0 were from 0900 h to 1400 h Monday, 1000 h to 1400 h Tuesday and 1200 h and 1400 h Wednesday.

Compared with controls, shiftworkers valued the mornings and evenings Monday to Friday and all day across the weekend significantly higher for preferred work time ($p < 0.01$, $t_{158} > 2.701$). Compared with shiftworkers with 17–23 years experience, controls valued the morning and early afternoons significantly higher for preferred work time ($p < 0.01$, $t_{158} < -2.72$) (figure 4).

Figure 2. The significant differences in preferred work time between controls and shiftworkers with 5–10 years shiftwork experience. The dark grey regions indicate the times of the week that the shiftworkers indicated a higher preference than the control group. The black regions indicate the times of the week that the control group indicated a higher preference than the shiftworkers.
3.5. 23–30 years shiftwork experience
The 56 shiftworkers in this group had been shiftworkers equal to or greater than 23 years and less than 30 years. Shiftwork experience ranged from 23 years to 29.5 years, with a mean of 25.0 ± 1.8 years. These workers had a mean age of 45.0 ± 5 years. Matched controls had a mean age of 44.0 ± 5 years.
Shiftworkers indicated their peak preferred times valued at 6.0–7.0 from 0700 h to 1500 h Monday, 0800 h to 1500 h Tuesday and 0900 h to 1500 h Wednesday and Thursday.

Compared with controls, shiftworkers with 23–30 years experience indicated significantly higher preference for work time in the early mornings and late evenings Tuesday to Friday ($p < 0.01$, $t_{110} = -2.894$). Compared with shiftworkers with 23–30 years experience, controls preferred 0900 h Tuesday to Friday significantly higher for preferred work time ($p < 0.01$, $t_{110} = -2.629$) (figure 5).

3.6. 30–38 years shiftwork experience
The 28 shiftworkers in this group had been shiftworkers equal to or greater than 30 years and less than 38 years. Shiftwork experience ranged from 30 years to 38 years, with a mean of 33.8 ± 2.5 years. These employees had a mean age of 51.0 ± 3 years. Matched controls had the same mean age of 51.0 ± 3 years.

Shiftworkers demonstrated peak preference for work valued at 6.0–7.0 from 0800 h to 1400 h Monday and Tuesday, 1200 h to 1400 h Wednesday and 0900 h to 1400 h Thursday.

Compared with controls, shiftworkers with 30–38 years experience indicated a significantly higher preference for work in both the early mornings and evenings across the entire week ($p < 0.01$, $t_{54} = -2.71$) (figure 6).

4. Discussion
This study found that preferred hours-of-work fluctuate for shiftworkers depending on years of experience. Many factors influence individual work and non-work preference. Previous researchers suggest that habit, age, gender, experience, dependents and health concerns contribute to this choice (De la Mare and Walker...
Family-friendly policies are currently being encouraged and legislation is seen to support a worker’s life both inside and outside of the workplace. Thus, facilitating worker participation in the establishment of working time arrangements may be viewed favorably by all stakeholders. Previous researchers have recommended that workers be involved in the design and ownership of their working time arrangements (De la Mare and Walker 1968, Wedderburn 1981, Oginska et al. 1993, Colquhoun et al. 1996, Smith and Evans 1999). Knowing that different groups of workers have different needs at different times in their lives and incorporating these needs into working time arrangements may help employees to balance work and non-work responsibilities and assist organizations to retain staff. Staff attrition may potentially be curtailed to a more manageable and affordable level if staff preferences were acknowledged and incorporated into a roster configuration.

Shiftworkers leave shiftwork for a variety of reasons. These have been related to age, family, social, health and sleep concerns. Also, rather than experience simply making shiftwork easier, older shiftworkers are reported to find it harder to manage and in some cases intolerable (Monk and Folkard 1985, Corlett et al. 1988).

Shiftworkers with 0–5 years shiftwork experience demonstrated a greater span of hours for preferred paid work across the day compared to age-matched controls. As shiftwork experience increased (5–10 and 10–17 years) this span of hours decreased to be more in keeping with age-matched controls that reflect social norms. However, after 17 years of experience, the span of working hours increased, only to be slightly reduced again after 30 years experience. In each experience category, the main differences between controls and shiftworkers were found across the night from 00 h to dawn.

![Figure 6. The significant differences in preferred work time between controls and shiftworkers with 30–38 years shiftwork experience. The dark grey regions indicate the times of the week that the shiftworkers indicated a higher preference than the control group. The black regions indicate the times of the week that the control group indicated a higher preference than the shiftworkers.](image-url)
Night shift was the shift least preferred by shiftworkers who had 5–10 years (mean age of 36 ± 10 years) and 10–17 years (mean age 38 ± 9 years) experience. In both groups, the majority of participants had partners. About one third of those with 5–10 years experience and about a half of those with 10–17 years experience had dependent children. These factors may have influenced their preferred work times. In many cases it has been found that the noise created by children either within the home or neighbourhood is likely to disturb day-time sleep (Kurumatani et al. 1994, Knauth and Costa 1996) and a personal relationship may be put under unnecessary pressure by night work (Australian Council of Trade Unions (ACTU) 1999). For shiftworkers in their first 5 years and those in their 30th-year-plus of shiftwork, night work was shown to be a low priority. Nevertheless, these employees preferred night work during the week and less over the weekend.

Shiftworkers who had between 17–30 years experience indicated that generally any time across the week was preferred for work. This period of time traverses both the sensitization and the accumulation phase of shiftwork (Rutenfranz et al. 1985). During both phases it has been suggested that the worker seeks improvements to family and work conditions. As penalty payments are highest at night and over the weekend (Allan et al. 1998) it may be that these workers are prepared to work at any time, on any day, in order to maximize their financial remuneration and hence improve family financial conditions.

A number of researchers have suggested that advantages exist if workers are able to choose their own work times to reflect their individual requirements and commitments (De La Mare and Walker 1969, Wedderburn 1981, Kurumatani et al. 1994). Wedderburn (1981) commented that it should be relatively easy to maximize the match between an individual’s preference and their working times. Moreover, he suggested that ultimately this process would be better for shiftworkers if they designed their own roster rather than a roster clerk.

Barton et al. (1993) demonstrated that tolerance to shiftwork could be influenced by schedule characteristics. A regular schedule was thought to assist the worker to organize non-work commitments and activities. Further, a flexible roster, taking individual preferences into account was thought to be of greater benefit than a system without such considerations. Overall, they suggested that an individual’s level of ‘control’ had an impact on their tolerance to shiftwork; the greater the control the better the tolerance (Barton et al. 1993).

As the number of individuals exposed to non-traditional hours-of-work increases, it is likely that worker dissatisfaction with rosters will continue. Moreover, in circumstances where those developing the roster do not understand the physiological and psycho-social impact of shiftwork, the final roster may be worse than in situations where those who design the roster also work it. Wedderburn (1981) describes shiftwork as a working experience that crosses the work, non-work divide. He suggests that this combining of the physical and psychosocial realms, due to a particular working lifestyle, challenges some of the ‘fundamental questions about the meaning and purpose and priorities of human life’ (Wedderburn 1981: 332).

For women, the burden of balancing family and work reduces with age. It has been found that once women pass 50 years-of-age, their subjective health indices improve and they prefer to remain in paid employment, even if it’s shiftwork (Oginska et al. 1993). In contrast, men have been found to demonstrate a deterioration in health as they age (Monk and Folkard 1985, Oginska et al. 1993). In addition, workers with longer shiftwork experience demonstrate poor ‘sleep hygiene’
(Foret et al. 1981) (an example of good sleep hygiene is maintaining bedroom only for sleep and sex, regulating temperature, light and noise and minimising caffeine and alcohol intake). It has been suggested that shiftwork becomes intolerable for some workers in their late forties or early fifties (Monk and Folkard 1985) and that the problems associated with their non-traditional hours become more difficult to manage (Corlett et al. 1988). It is not surprising then that less than 20% of shiftworkers expect to continue with their non-traditional hours up until they retire (Koller et al. 1978). In fact, some researchers suggest that once shiftworkers reach 45 years of age they should have the right to move from shiftwork to day work (Akerstedt and Knutsson 1997).

It appears from the results that these shiftworkers were prepared to work a range of unsociable hours for a period lasting up to 13 years. Individuals may choose alternative hours after this time or even dislike shiftwork to such a degree that they leave. In addition, a degree of burn out may occur during these years of unfettered shiftwork. Allowing individuals the flexibility to rearrange their working times after sustained shiftwork may minimize the loss of skilled, experienced workers from the workplace. At a time when voluntary separation packages are targeting the most ‘expensive’ workers, the leakage of expertise from the workplace may become too great and organizations may need more than ever to address work preference as a means of retaining valued employees.

References


