

# THE EFFECT OF THREE SHIFT SYSTEMS AS PERCEIVED BY THE PARTNERS OF EMERGENCY SERVICES WORKERS

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## ABSTRACT

This study is aimed at determining the effect of different shift systems on the social and domestic life of a sample of emergency services workers. The opinions of the partners of these workers were sought, because the influence of shift work should be viewed within the context of the family as its members are directly affected by the work schedules of shift workers. Three different shift schedules worked within the same service sector (emergency services) were compared in terms of the influence they have on the social and domestic life of the worker. The perceptions of a sample of 67 partners of shift workers, distributed across the three shift schedules, were investigated. Significant differences favouring the shift system involving the least number of working hours per week were obtained.

## OPSOMMING

Die doel van die ondersoek was om die effek van verskillende skofstelsels op die sosiale en huislike lewe van 'n steekproef van werkers in die nooddienste te bepaal. Die menings van die gades van hierdie werkers is nagevors, want die uitwerking van skofwerkstelsels behoort in die konteks van die gesin gesien te word, aangesien gesinslede direk beïnvloed word deur die skofskedules van die werker. Drie verskillende skofstelsels wat in dieselfde dienssektor (nooddienste) gewerk word, is vergelyk in terme van die invloed wat dit op die werker se sosiale en huislike lewe het. Die persepsies van 'n steekproef van 67 gades van skofwerkers, oor die drie skofstelsels versprei, is nagevors. Beduidende verskille ten gunste van die skofstelsel wat die minste werkure per week behels, is gevind.

Companies are currently functioning in a rapidly changing environment characterised by sophisticated technology and a fluctuating economy. This has resulted in companies extending normal working hours to working shifts, thereby allowing for increased organisational competitiveness, flexibility and profit (Kogi, 1985). Shift work takes place in a wide variety of industries. It is generally implemented where the type of product or service delivered, necessitates continuous work that spans a 24-hour period. This is made possible through rotating one group of workers with another so as to enable a continuous workflow. Folkard and Monk (1985) define shift work as any system of fixed working hours, in most cases 8 hours in length, that falls outside the normal day's work period of 08:00 to 17:00 hours. Examples of shift work are night shifts, rotating shifts and evening shifts.

In the past, shift work has proved to be economically beneficial to companies, but Overman (1993) states that this type of work is more than a schedule for the worker. It becomes a life-style and consequently influences the worker's productivity, health, social and domestic life and also causes fatigue and sleep disturbances. Working shifts influences the natural rhythm or biological clock of the individual's body, because it entails working when one should be sleeping and having to sleep when one should be awake. Unfortunately, it is true that a large number of the shift working population find it hard to adapt (Overman, 1993).

Colquhoun and Rutenfranz (1980) conclude that this difficulty in adapting results in stress that is not related to the work itself, but arises from the strain of complying with the unnatural patterns of activities and sleep that shift work demands. According to these authors it has the potential of leading to ineffectiveness in the work-place, impaired health, a lower sense of wellbeing, fatigue and disturbed sleep patterns, and dysfunctional relationships. Consequently a main preoccupation with life becomes that of getting enough sleep, adapting to the circadian rhythms and adjusting to an impaired social and domestic life (Folkard & Monk, 1985). The disturbances most often experienced as a result of working shifts will now be described in more detail.

## Circadian rhythm

Minors and Waterhouse (1985) state that humans have evolved in a rhythmic world, with changes occurring through the year as the seasons pass. More obvious than these fluctuations, are the changes associated with the solar day, which recur every 24 hours. Not only is there an alternation in light intensity and environmental temperature between night and day, but social behaviour is also structured according to the solar day. The normal social rhythm is one of daytime work, evening leisure and night sleep. Rhythmicity is not only present in environmental and social behaviour, but also on a biological level. It has become evident in the last few decades that biological variables that show rhythmical patterns with a cycle length of 24 hours, are very common. These are termed circadian rhythms (Minors & Waterhouse, 1985).

According to Monk (1988), the main function of circadian rhythms is to determine when one should sleep and when one should be awake. Circadian rhythms regulate body temperature, heart rate and blood pressure, and also lead to the excretion of hormones such as cortisol, which results in wakefulness, and melatonin which helps the individual to feel drowsy and fall asleep (Arendt, Minors & Waterhouse, 1989). The shift worker often has to work during the sleeping time dictated by the cycle, causing tension for the worker. For instance, when the worker wants to sleep during a period reserved for being awake, the circadian rhythm will induce mechanisms to prevent sleep, for example biological needs such as hunger pains. It might therefore be impossible for the worker to get the necessary seven to eight hours uninterrupted sleep (Rutenfranz, Haider & Koller, 1985). Shift work still continues, regardless of the problems that it may cause the worker, such as impaired sleep and consequent ineffectiveness at work (Barton & Folkard, 1991).

## Sleep and fatigue

The reduction in daily sleep and increased sleepiness on the job prove to be among the most prevalent problems encountered by individuals engaged in shift work, especially night shifts. Sleepiness is well documented to be a factor that impairs performance and also the ability to be visually vigilant or react quickly. These aspects are prone to degradation as sleepiness increases (Dinges, Gillen & Ott, 1994).

According to Horne (1983) the unusual hours that shift workers often work, make it problematic to get sufficient sleep.

Consequently, the workers try to make up for their sleep debt during their rest days in the usual night sleep period. Although they may feel better after this recovery sleep, which usually exceeds the normal length of sleep, it may not be in the long-term interest of the shift worker. It further encourages the habit of sleeping at night and also of taking more sleep than usual during this period. Poor management of sleep on recovery days may make the adjustment of sleeping for shorter periods at abnormal hours more difficult (Horne, 1983).

Rutenfranz, Haider and Koller (1985) states that the need for sleep varies considerably across individuals and at different age levels, but it typically exceeds that which can be obtained when working a night shift. It appears that no significant sleep disturbances are experienced when working during normal day hours, or shifts that do not include night work. However, shift work that includes continuous night shifts results in sleep problems, since the day sleep of night workers tends to be interrupted by external factors such as traffic sounds, ringing telephones and children playing (Rutenfranz, Haider & Koller 1985). During a night shift, individuals have to work at the lowest point of biological rhythm of body temperature and the highest point of fatigue. Operational fatigue can also enhance the decrease of alertness naturally occurring at night. As fatigue increases, individuals seem to lose the smooth coordination of the different parts of the task and attention is less efficiently allocated (Holding, 1983).

#### **Social and domestic life**

Sleep disturbances, abnormal working hours and fatigue not only have an influence on the shift worker's work performance, but also impact on domestic life and social relationships. The biological and social disruption associated with working shifts are widely recognised as being a problem for many shift workers and causing tremendous strain within the family system (Waterhouse, Folkard & Minors, 1992). Despite this recognition, few attempts have been made to examine the shift working/home interface, in particular, the psychological state of the worker at the end of the day and possible carry-over effects of mood from work to home (Barton, Aldridge & Smith, 1998).

Most community activities take place in the evenings or over weekends, because society still assumes and expects individuals to work during the week within normal working hours, regardless of present economic demands for around-the-clock production. Consequently, the shift worker is excluded from taking part in these social activities, because shift work consists of working during most of these periods (Barton, Costa, Smith, Spelten, Totterdell & Folkard, 1995). The workers may also be excluded from social gatherings, because their friends find it difficult to predict the free time available to the shift worker. Shift work also does not allow the individual time for interactive activities and social hobbies. This is caused by two factors. First, the shift worker needs to work when most social and recreational activities take place and secondly, fatigue associated with night work usually carries over into recreational time and rest days (Walker, 1985). Repetti (1989) conducted a study on air traffic controllers returning home after a demanding shift, and they were found to be more socially withdrawn than usual. Monk (1988) concludes that the shift worker would probably prefer to sleep when free time is available, rather than take part in recreational activities or social hobbies. Taking this into account, it is very doubtful whether the individual would become part of an organised social club, as it would be difficult to fulfil the required responsibilities associated with membership, for instance attending meetings (Walker, 1985).

Kurumatani, Koda, Nakagiri, Hisashige, Sakai, Saito, Aoyama, Dejima and Moriyama (1994) conducted a study relating to the influence that shift work has on the daily and social activities of female Japanese nurses. It was established that the nurses spent their free time on activities such as child care and domestic activities. Insufficient time was allocated to social activities and leisure time. Although shift workers have

certain constraints regarding social activities, they have more free time during the day than individuals who work normal day hours. This allows them to partake in solitary activities such as gardening, fishing or visiting the doctor, but this often happens at the expense of getting sufficient sleep after a night's work (Barton et al, 1995).

Shift work furthermore has a definite impact on the domestic life of the worker. It influences the relationship between the shift worker and his/her partner as well as the family. The quantity and quality of time spent with the partner and family often gets neglected, since the shift worker needs to catch up on lost sleep after working during the night. If the individual does not get enough rest, it could result in fatigue and irritability. In an examination of father-child interactions for 4 to 10-year old children, difficult work conditions were found to be associated with lower levels of emotional involvement with the child (Repetti, 1989). Walker (1985) explains that shift work can also interfere with certain roles that the worker needs to fulfil, such as being a spouse and/or partner. The shift worker on night work will not be able to provide companionship, protection or emotional support in relation to the spouse. In all of the above-mentioned cases, the interaction with the family and partner suffers. This in turn causes a strenuous situation for the shift worker, which makes it even more difficult for the individual to cope with an already demanding life-style (Smith & Folkard, 1993).

The changing nature of work has led to a growing concern about the interplay between work and non-work experiences, in particular the impact of conflict between home and work roles (Taylor, Brinner & Folkard, 1997). The limited evidence available suggests there may be a relationship between structural work/non-work conflict and shift work tolerance (Bohle & Tilley, 1989). Taylor et al. (1997) explain that structural work/non-work conflict occurs when the time available for social and domestic activities is limited by work requirements. It is a particular problem for shift workers required to work on evening, night or weekend shifts. The available evidence suggests that the psychological health effects caused by conflict between home and work roles can range from psychological strain, anxiety and depression to burnout and substance abuse. Pisarski, Bohle and Callan (1998) found that social support (co-workers and family) has both direct and mediating effects on structural work/non-work conflict and symptoms. The presence of a partner is a determinant of shift work tolerance either in the form of social support (usually from men) or in the form of someone who needs to be taken care of (usually for women). All of this tends to support the saying that shift work is only tolerable with the support of a partner (Beerman & Nachreiner, 1995).

Another way of looking at the effects of shift work on domestic life is to consider the burden on the shift worker's partner. Brown (1959) identified some disadvantages of shift work on the partner that range from the partner having to organise their lives around the work pattern of the shift worker (for instance the provision of meals at abnormal hours and keeping quiet so as not to disturb the sleep of the worker, as well as a restricted or solitary social life) to nervousness and loneliness experienced in the evenings or at night when alone at home. Mott, Mann, McLoughlin and Warwick (1965) found that shift work also has an impact on marital happiness and family integration. The worker is not able to fulfil certain roles or to take part in valued family activities, because the irregular hours of shift work make it difficult. This leads to conflict and consequently relational problems occur between the shift worker and his or her family. Shift working families can and do experience a significantly greater number of general conflicts and tensions than day-working families (Monk & Folkard, 1992).

The structure of the family entity determines how well the worker copes with the social and domestic demands of working shifts. If the shift worker is married and also has children, it tends to put more pressure on the worker to be responsible

for the family. This additional responsibility leaves the worker with even less time to spend on sleeping and individual leisure activities, because the worker feels obligated to spend any free time with the children. Shift workers who do not have partners and children, do not have this additional pressure and responsibility. They are free to do whatever they want in their leisure time, but do not have the necessary support from a close family to enable them to tolerate the effects of shift work (Barton et al, 1995).

Brown (1959) conducted a study where the specific influence of shift work on the partner was investigated. Interviews were conducted with the partners and some inconveniences were identified. He found that female partners, in particular, experience tension and loneliness when their partners are working night shift. The wife is also obligated to stay at home in the evenings to look after the children and needs to take responsibility for her own and the children's safety. Other problems in terms of domestic arrangements are also experienced, especially during the day. The wife has to attend to her domestic chores, but it needs to be done quietly so as to not disturb the day sleep of the night worker.

Marriage and shift work seem to be incompatible, because of the strain experienced by the worker regarding family relationships. Divorce rates among shift workers greatly exceed the norm, because spouses frequently voice great dissatisfaction with shift workers' schedules. The partners blame the work patterns for family life disruptions (Snyder, 1995). However, Brown (1959) notes that there are some advantages to shift work in terms of domestic arrangements. The shift worker and his or her partner can share household tasks, for instance shopping, cooking and cleaning, because the shift worker is at home during the day. If the partner of the shift worker does not work during the day, leisure activities can be shared. It should, however be taken into consideration that all of these activities take place at the expense of the shift worker's sleep.

In a study conducted by Smith and Folkard (1993), the specific feelings and perceptions of the partners of shift workers who had been on the job for an average of over seventeen years, were investigated. The partners were asked to comment on what they thought the influence of shift work was on the worker. The group reported high levels of dissatisfaction with regard to the physical problems experienced by the shift worker. The partners also stated that the shift workers seemed to be irritable and that the negative state of mind of the worker created a dysfunctional relationship within the family. It can be concluded from this research that shift work has an indirect negative effect on the partners of shift workers.

It should be clear that shift workers' partners as a group can be potential sources of important information regarding the influence of shift work on the social and domestic life of the worker. Smith and Folkard (1993) remarked that the opinions and feelings of shift workers' partners are not often sought when conducting research with regard to shift work. The social and domestic impact of shift work cannot be studied by only focusing on the worker. The influence of such work schedules should be viewed within the context of the whole family.

This article will focus on three different shift systems and how they compare in terms of their influence on the social and domestic life of the worker. It is important to investigate this influence, because it has an impact on the personal life of the worker, and is also carried over to the work environment where it can, in turn, have an effect on the performance of the worker. The comparison between the three different shift systems will be obtained in terms of the perceptions and feelings of the partners of shift workers working on the different systems. The comparison could lead to determining which one of the three work schedules is most acceptable to the partners of the shift workers.

Emergency services workers have to tolerate the problems associated with working shifts, and the type of work conduc-

ted is also emotionally very demanding. They are often confronted with traumatic incidences ranging from serious car accidents to being the first on the scene of a suicide. This happens on a day-to-day basis and could lead to additional strain on the shift worker.

Three different shift systems are followed in the emergency services sector, namely the two-shift system (24 hours of work, 24 hours off duty), the three-shift system (24 hours of work, 48 hours off duty) and the four-shift system (24 hours of work, 72 hours off duty). The emergency services workers referred to in this study are employed by the Metropolitan Council, which falls under local authority. These workers are multiskilled in that they are trained in both fire-fighting and first aid (paramedics).

Because of the nature of the work (emergency services), the workers do not have a choice of not working shifts, but they do have a choice with regard to which one of the shift schedules to work on. Emergency services workers were chosen to be the respondents in the present study, because of the clear distinction between their three shifts within one service sector.

The hypothesis of this study is that there will be differences between the three shift systems with regard to the social and domestic influence, as perceived by partners.

## METHOD

### Participants

The participants consisted of 67 female partners of emergency services shift workers. They were distributed across the different shift systems, with 24 participants representing the two-shift system, 25 participants representing the three-shift system and 18 participants representing the four-shift system. There were 46 participants between the ages of 18 and 30, and 21 participants were older than 30. There were no significant differences in the age groups between the partners representing the different shift systems.

With regard to the relationship between partners and shift workers, 56 participants were married to or were living together with the shift worker, whereas 11 participants were living separately from the shift worker. There were no significant differences between the three shift systems with regard to the living arrangements of the partner and the shift worker.

Regarding the number of children under the age of 18 years old who needs to be taken care of by the partners, 17 participants indicated that they had one child, 19 participants had two children and 10 participants had three or more children. No significant differences were obtained between the three different shift systems with regard to the number of children under the age of 18 years that the partners have to take care of.

There were only females in the sample of partners, because the number of female emergency services workers are limited. Some female workers were requested to ask their male partners to complete the questionnaire, but there was no response.

### Procedure

The questionnaire, as well as an introductory letter, were provided to shift workers located across eight different emergency services stations. They were asked to request their partners to complete the questionnaire and return it in a sealed envelope (to ensure confidentiality). It was clearly stated that participation would be on a voluntary basis. Anonymity was also guaranteed, as no names were required on the questionnaire.

### Measuring instrument

The measuring instrument used in this study was the Shift Work Survey: Partner's Questionnaire that was adapted from a questionnaire with the same title. This questionnaire was utilised in a study conducted by Smith and Folkard (1993) to

determine the perceptions of the partners of shift workers with regard to the influence of shift work on their social and domestic life. The nature of the adaptation made to the questionnaire comprised of changing its graphical rating scales that consisted of a numerical anchor at each end of the scale only, to five or seven point scales with each value anchored on the scale. This was done to simplify and increase the accuracy of scoring the questionnaire.

The questionnaire was divided into three categories, namely (a) the shift that the partner of the worker would prefer and dimensions measuring the reason for that preference, (b) the partner's perception of the influence that shift work has on the worker, and (c) the partner's feelings about the influence that shift work has on his/her own personal life. The questionnaire consisted of several sub-scales as reflected in Table 1.

TABLE 1  
DESCRIPTIVE STATISTICS AND RELIABILITY COEFFICIENTS OF THE  
MEASURING INSTRUMENTS

Measuring instrument	Mean	SD	Number of items	Cronbach alpha
Shift Preference Indicator	3,67	0,88	11	0,90
Total Social/Domestic Scale	3,01	0,78	30	0,93
Social Scale	2,92	0,75	12	0,81
Domestic Scale	3,09	0,85	11	0,90
Non-Domestic Scale	3,00	0,83	7	0,80
Sleep and Fatigue Scale	3,11	0,99	5	0,82
General Health Questionnaire	3,46	1,07	7	0,91
Work Performance Scale	3,99	0,95	3	0,80
Total Discomfort Scale	4,01	1,00	11	0,83
Relationship Discomfort Scale	4,48	1,77	3	0,90
Sleep Disorder Scale	3,01	0,54	12	0,80
Epworth Sleepiness Scale	2,09	0,53	8	0,71
Relationship Behaviour Questionnaire	3,64	0,73	30	0,94

#### Shift Preference Indicator

This instrument formed part of the larger Shift Work Survey: Partner's Questionnaire (Smith & Folkard, 1993). Before filling out this questionnaire, participants had to indicate which shift system they prefer. The shift preference indicator includes dimensions that determine the reason for and strength of the preference. There were 11 five-point Likert items in the questionnaire with high scores indicating a favourable attitude. The internal consistency reliability of the questionnaire, as measured by Cronbach's alpha, was 0,89.

#### Total Social/Domestic Scale

This instrument comprises three questionnaires, namely the (a) Social Scale, (b) Domestic Scale, and (c) Non-Domestic Scale. This scale included 30 items of which eight were reverse coded. Five-point Likert type items were used for measuring this variable, with a high score indicating high discomfort experienced. The reliability of this variable, as measured by Cronbach's alpha was 0,93. The instrument was adapted from the shift summary and personal information questionnaires that were included in the Shift Work Survey: Partner's Questionnaire utilised in a study conducted by Smith and Folkard (1993). The Cronbach alpha reliability of this questionnaire was 0,93. It also contains questions that were adapted from the social and domestic survey that forms part of the Standard Shift Work Index (Barton, Folkard, Smith, Spelten & Totterdell, 1995).

#### Social Scale

The Social Scale is a component of the above-mentioned scale and aims at determining the social discomfort of working shifts, as perceived by the partner of the worker. It comprises 12 items of which four were reverse coded. The reliability of this variable as measured by Cronbach's alpha was 0,81.

#### Domestic scale

The Domestic Scale is also an underlying component of the Total Social/Domestic Scale and measures the domestic

problems experienced when working shifts, as perceived by the partner of the worker. It includes 11 items of which four are reverse coded. The Cronbach alpha for this variable was 0,85.

#### Non-Domestic Scale

The third component of the total social/domestic scale is the Non-Domestic Scale that measures the partner's perception of non-domestic discomfort perceived to be experienced by the shift worker. A total of seven items were included to measure this variable. It yielded a Cronbach alpha of 0,77.

#### Sleep And Fatigue Scale

This variable was included to determine the influence of shift work on the sleep and fatigue experienced by the worker, as perceived by the partner. It was adapted from the Shift Summary And Personal Information Questionnaires that were included in the Shift Work Survey: Partner's Questionnaire (Smith & Folkard, 1993). For the above-mentioned study, the Cronbach alpha was 0,93. This scale consists of five items and a five-point Likert type scale was used, with high scores indicating a strong influence of shift work on the sleep and fatigue of the worker. The Cronbach alpha obtained in the present study was 0,82.

#### General Health Questionnaire

This questionnaire determines the influence of shift work on the general health of the worker, as perceived by the partner. It was adapted from two questionnaires, namely the Shift Summary and Personal Information Questionnaires (Cronbach Alpha = 0,87) that were included in the Shift Work Survey: Partner's Questionnaire (Smith & Folkard 1993). To measure this variable, seven items were used, which yielded a Cronbach alpha of 0,91. A five-point Likert scale was utilised, with a high score indicating a high influence on general health.

#### Work Performance Scale

This scale was included so as to determine the effect that shift work has on the work performance of the worker, as perceived by the partner. It contains items that were adapted from two questionnaires that were included in the Shift Work Survey: Partner's Questionnaire (Smith & Folkard 1993), namely the Shift Summary And Personal Information Questionnaires. It comprises three items measured on a five-point Likert scale, with a high score indicating a high impact of shift work on the work performance. The Cronbach alpha was 0,75.

#### Total Discomfort Scale

The scale measures the total discomfort that the partners themselves experience as a result of the schedule of the shift worker. Its items were based on the Personal Information Questionnaire (Cronbach alpha = 0,81) that was included in the Shift Work Survey: Partner's Questionnaire (Smith & Folkard 1993). To measure this variable, 11 items were included of which three were reverse coded. A seven-point Likert type instrument was used to measure this variable, with a low score indicating a high discomfort. A Cronbach alpha of 0,83 was obtained.

#### Relationship Discomfort Scale

This variable measured the relationship discomfort experienced by the partner of the shift worker, as a result of shift work. It contains items that were also adapted from the Personal Information Questionnaire, included in the Shift Work Survey: Partner's Questionnaire (Smith & Folkard 1993) and includes three items. A Cronbach alpha of 0,88 was obtained. Seven-point Likert items were used, with a low score indicating high relationship discomfort experienced.

#### Sleep Disorder Scale

This scale is identical to the Sleep Apnea Scale (Cronbach alpha = 0,83) that was utilised in a study conducted by Visser (1999). The aim of the study was to examine the cross-cultural applicability, internal consistency and construct validity of the Standard Shift Work Index. It was included in the present study because of its relevance to the research question. The scale measures the extent of sleep disorders experienced by

the worker as a result of shift work, as perceived by the partners. Twelve four-point Likert items were used, with a high score being indicative of sleep disorders. The reliability of this variable as measured by Cronbach's alpha was 0,77.

#### Epworth Sleepiness Scale

This scale was utilised in the study conducted by Visser (1999) and the internal consistency reliability as measured by Cronbach's alpha was 0,75. Its psychometric properties were examined in two studies conducted by Johns (1992, 1994). In the first study, the Epworth Sleepiness Scale was used to measure daytime sleepiness (Cronbach alpha = 0,88) and in the second study it was utilised to measure sleepiness in different situations (Cronbach alpha = 0,73). Since the Epworth Sleepiness Scale had high reliabilities in the previous studies, it was included in this study so as to indicate the amount of sleepiness experienced by the worker as a result of shift work, as perceived by the partner. Eight items measured on a four-point Likert scale were included, with a high score indicating severe sleepiness. The Cronbach alpha obtained for this variable was 0,71.

#### Relationship Behaviour Questionnaire

This variable is aimed at describing behaviour in the relationship between the shift worker and the partner, as viewed by the latter. It comprises items that were included in the Relationship Questionnaire, which formed part of the Shift Work Survey: Partner's Questionnaire (Smith & Folkard 1993). Thirty items were utilised and two of these items were reverse coded. A five-point Likert scale was used for measuring the items, with a low score indicating an unfavourable attitude towards the behaviour within the relationship. The reliability as measured by the Cronbach alpha was 0,94.

## RESULTS

The data were analysed in two phases. In the first analysis the reasons why respondents preferred a particular shift, as indicated in the Shift Preference Indicator, were analysed to deter-

TABLE 2  
DESCRIPTIVE STATISTICS OF THE SHIFT PREFERENCE INDICATOR (SPI)  
ACROSS THREE PREFERRED SHIFT SYSTEMS

	Two-shift system			Three-shift system			Four-shift system		
	Mean	SD	N	Mean	SD	N	Mean	SD	N
SPI	3,73	0,78	9	3,17	0,98	21	3,97	0,69	32

TABLE 4  
COMPARISON OF MEANS OF PERCEPTION OF PARTNER SCALES FOR THREE DIFFERENT SHIFT SYSTEMS (INDEPENDENT VARIABLE)

Measuring instruments	Two-shift system (N = 24)		Three-shift system (N = 25)		Four-shift system (N = 18)		Sum of squares	df	Mean squares	F	p
	Mean	SD	Mean	SD	Mean	SD					
Total Social/Domestic Scale	2,49	0,54	2,92	0,89	4,03	0,33					
Social Scale	2,47	0,60	2,80	0,90	3,92	0,39	9,51	2	4,76	9,71	0,001
Domestic Scale	2,41	0,59	2,92	0,91	4,15	0,46	13,19	2	6,60	12,72	0,000
Non-Domestic Scale	2,63	0,72	3,13	0,94	4,02	0,22	8,21	2	4,10	7,25	0,003
Sleep and Fatigue Scale	2,67	0,61	2,47	0,66	3,82	1,10	8,81	2	4,41	7,51	0,003
General Health Questionnaire	2,62	0,77	3,41	1,26	4,30	0,72	12,25	2	6,13	6,25	0,006
Work Performance Scale	3,63	0,86	3,56	1,33	4,43	0,87	3,77	2	1,89	1,62	0,217
Total Discomfort Scale	3,73	0,92	3,76	0,98	5,02	0,73	8,79	2	4,39	5,30	0,011
Relationship Discomfort Scale	3,90	1,44	3,41	1,89	6,24	0,85	37,28	2	18,64	7,81	0,002
Sleep Disorder Scale	2,89	0,60	2,89	0,56	3,14	0,54	0,34	2	0,17	0,53	0,597
Epworth Sleepiness Scale	2,34	0,46	2,18	0,72	1,82	0,28	1,17	2	0,58	1,89	0,171
Relationship Behaviour Questionnaire	3,68	0,53	3,38	0,82	3,98	0,28	1,66	2	0,83	2,09	0,143

Wilks' lambda = 0,149 F (2,64) = 2,46, p = 0,00

TABLE 3  
ANOVA SUMMARY TABLE OF PREFERRED SHIFT SYSTEM (INDEPENDENT  
VARIABLE) WITH REGARD TO THE SHIFT PREFERENCE INDICATOR (SPI)

	Sum of squares	df	Mean squares	F	p
<b>SPI</b>					
Between shifts	8,12	2	4,06	6,18	0,004
Within shifts	38,75	59	0,66		
Total	46,87	61			
<b>SPI Financial</b>					
Between shifts	25, 20	2	12,59	7,60	0,001
Within shifts	99,90	60	1,67		
Total	125,08	62			
<b>SPI Health</b>					
Between shifts	4,73	2	2,37	2,34	0,105
Within shifts	64, 75	64	1,01		
Total	69,48	66			
<b>SPI Social/Domestic</b>					
Between shifts	6,40	2	3,19	4,56	0,014
Within shifts	44,11	63	0,70		
Total	50,49	65			

mine whether these differed across the three preferred shifts. The results are given in Tables 2 and 3. The number of participants preferring a specific shift system is reflected in Table 2. The results show that the majority of participants prefer the four-shift system.

An ANOVA was conducted to determine whether there were significant differences between the means on the Shift Preference Indicator across the preferred shift systems. The results are given in Table 3. Post hoc comparisons utilising Scheffé's procedure were performed to establish which preferred shifts differed significantly. Only in the case of the three-shift and four-shift systems significant differences were obtained F (2,59) = 6,18, p = 0,004.

The items of the Shift Preference Indicator were divided into categories measuring financial, health, and social/domestic reasons. Significant differences favouring the four-shift system over the three-shift system were obtained for the financial (p = 0,000) and social/domestic (p = 0,030) reasons.

For the second phase of the analyses, the perceptions of the respondents with regard to the way shift work influences their private lives were studied across the three shift systems. A one-way MANOVA was conducted, using the measuring instruments listed in Table 4 as dependent variables and the shift system as the independent variable. It should be noted that the components of the Total Social/Domestic Scale, rather than the full scale, were used in the analysis.

Wilks' lambda was utilised to determine whether the centroids of the three groups differed significantly. The obtained lambda of 0,149 with associated  $F(2,67) = 2,46$  was statistically significant.

With regard to the 11 partner perception scales, significant differences between the three shifts (see Table 4) were obtained for the Social Scale, the Domestic Scale, the Non-Domestic Scale, the Sleep and Fatigue Scale, the General Health Questionnaire, the Total Discomfort Scale and the Relationship Discomfort Scale ( $p = 0,002$ ). Post hoc tests, using Scheffé's procedure, were subsequently performed on the 11 variables to investigate between which shift systems the means differed significantly. The results are reflected in Table 5.

TABLE 5  
RESULTS OF POST HOC SCHEFFÉ TESTS PERFORMED ON STATISTICALLY SIGNIFICANT COMPARISONS OF TABLE 4

Measuring instrument	Shift system	Versus shift system	Mean difference	p
Social Scale	Two-shift system	Three-shift system	-0,33	0,538
		Four-shift system	-1,46	0,001
	Three-shift system	Two-shift system	0,33	0,538
		Four-shift system	-1,13	0,008
Domestic Scale	Two-shift system	Three-shift system	-0,51	0,253
		Four-shift system	-1,74	0,000
	Three-shift system	Two-shift system	0,51	0,253
		Four-shift system	-1,23	0,005
Non-Domestic Scale	Two-shift system	Three-shift system	-0,49	0,305
		Four-shift system	-1,38	0,003
	Three-shift system	Two-shift system	0,49	0,305
		Four-shift system	-0,89	0,062
Sleep and Fatigue Scale	Two-shift system	Three-shift system	0,21	0,814
		Four-shift system	-1,16	0,016
	Three-shift system	Two-shift system	-0,21	0,814
		Four-shift system	-1,36	0,004
General Health Questionnaire	Two-shift system	Three-shift system	-0,79	0,178
		Four-shift system	-1,68	0,006
	Three-shift system	Two-shift system	0,79	0,178
		Four-shift system	-0,89	0,187
Total Discomfort Scale	Two-shift system	Three-shift system	-3,79	0,995
		Four-shift system	-1,30	0,023
	Three-shift system	Two-shift system	3,79	0,995
		Four-shift system	-1,26	0,025
Relationship Discomfort Scale	Two-shift system	Three-shift system	0,49	0,749
		Four-shift system	-2,33	0,016
	Three-shift system	Two-shift system	-0,49	0,749
		Four-shift system	-2,82	0,003

For the Social Scale, both the two-shift and three-shift systems differed significantly from the four-shift system. Similar results were obtained for the Domestic, Sleep and Fatigue, Total Discomfort, and Relationship Discomfort Scales. For the Non-Domestic and General Health Scales, a significant difference were obtained between the two-shift and four-shift systems.

## DISCUSSION

The present study focuses on the influence of shift work on the social and domestic life of the worker, but it was determined through investigating the perceptions of the partners of the shift workers. The main finding was the significant differences between the two-shift and three-shift systems in comparison

to the four-shift system in terms of the social, domestic, sleep and fatigue, total discomfort and relationship discomfort variables. It is evident from these results that the partners of shift workers on the two-shift and three-shift systems perceived the influence of shift work on their personal lives and on the worker as unfavourable, as opposed to the four-shift system which was perceived to be more favourable. This result can possibly be explained by the difference in the scheduling of the different shift systems. The four-shift system worker has more free time available than the three-shift and two-shift system workers. More time can be spent on social and domestic activities, as well as on sleeping. The worker also has more time available to spend with the partner, which can have a positive influence on their relationship.

The two-shift system differed significantly from the four-shift system in terms of non-domestic and general health variables. The two-shift system worker has a very demanding work schedule, which leaves little time for non-domestic activities. The general health of the worker is also influenced, as stress and anxiety are experienced in coping with the long working hours (Taylor, Brinner & Folkard, 1997). Shift workers can also experience some degree of digestive disorder ranging from peptic ulcers to mild indigestion (Heslegrave & Rhodes, 1997). The frequency of irregular meals taken by two-shift system workers is higher than that of four-shift system workers, which could explain the difference with regard to the General Health variable.

No significant differences were found between the three shift systems in terms of work performance, the Epworth Sleepiness Scale, sleep disorders and relationship behaviour variables. This result was surprising, because one would expect two-shift system workers to suffer poorer quality of sleep than workers on the other shifts, since they are allowed only one recovery day after a 24-hour shift. The result might be the consequence of partners not being able to give an indication of the quality of sleep attained by the shift workers.

With regard to the shift preferred by the partners of the shift workers, it was found that the four-shift system was most preferable. This can be explained by the fact that this schedule requires fewer hours of work, which leaves more free time available to the worker to spend with the partner and/or family. A significant difference in terms of the reasons given for the preference was detected between the three-shift and the four-shift systems. The difference was with regard to financial and social/domestic reasons. The financial preference of the four-shift system as opposed to the three-shift system can possibly be explained by the fact that the four-shift system worker has time available off-duty to engage in entrepreneurial and other part-time activities which could lead to financial gain. The time available between shifts also allows the four-shift system worker to engage more frequently in social and domestic activities.

Overall, it was found that the two-shift and three-shift systems were perceived less favourably than the four-shift system. However, in terms of the variables pertaining to shift preference, a difference was only detected between the three-shift and four-shift systems. This could be explained by the possibility that the partners who preferred the two-shift system, are committed to the schedule as the reasons given for the preference were favourable. Finally, it can be concluded that the partners of the shift workers differed in their perceptions of the influence of shift work, depending on the particular shift system that is worked. In general, it was found that the four-shift system is most acceptable to the partners of the shift workers.

The results suggest that the structuring of shift systems within the emergency services should be reconsidered. From the literature (Waterhouse, Folkard & Minors, 1992) it is clear that the abnormal working hours, sleep disturbances and fatigue that workers experience as a result of working shifts, influence work performance and also the social and domestic life of the

worker. The discomfort experienced by shift workers should at all costs be minimised, if possible. It is therefore recommended that the two-shift system (that was linked to unfavourable perceptions), be replaced by the more favourable three-shift or four-shift systems. This can make an already demanding work schedule more tolerable for the shift worker and his/her family.

A replication of the present study that includes a control group (partners of workers who do not work shifts, but follow normal-day working hours), needs to be conducted. The perceptions of the control group may then provide baseline results against which to evaluate the perceptions of partners of shift workers. Without baseline results it is difficult to evaluate the severity of the problems experienced by the partners of shift workers.

Although it has been stated that shift workers' partners as a group can be a possible source of valuable information (Smith & Folkard, 1993), it proved to be extremely difficult to find the participants for this study. Direct contact was often difficult to arrange, because the participants could seldom be located at the same place and time. An alternative could have been to conduct the study with the shift workers themselves in order to determine which shift system is most acceptable to them. However, this would have defeated the primary goal of the present study, namely to look at shift work through the eyes of the partners of shift workers.

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