

The impact of shiftwork on work–home conflict, job attitudes and health

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The present study was designed to test the impact of rotation and timing of shifts on work–home conflict, job attitudes, health and absenteeism among the military police. A total of 3122 employees participated in the study. Discriminant analysis was used to examine the relationships between rotation and timing of shifts on the one hand, and the outcome measures on the other. Whether employees had fixed dayshifts, fixed non-day shifts including weekends, or rotating shifts with or without weekends, could be predicted on the basis of the experienced work–home conflict, job attitudes, health and absenteeism. Each of the two parameters of shiftwork differentially affected the experience of the outcome measures. Rotation was most clearly related to unfavourable job attitudes (namely job satisfaction, cynicism, turnover intentions and professional efficacy), whereas timing was most clearly related to increased work–home conflict. The results suggest that fixed non-day shifts including weekends (i.e., during highly valuable times) should be avoided in order to minimize the conflict between work and home and that rotation rosters should be designed with a high degree of individualization and flexibility. These seem to be the most promising ways to reduce the negative consequences of shiftwork for employees, their families and organizations.

1. Introduction

The effects of shiftwork on psychological well-being and health have been well documented by comparisons between shiftworkers, on the one hand, and non-shiftworkers or former shiftworkers on the other (for an overview see, Costa 1996). One of the major problems that shiftworkers are confronted with is that they are required to ignore their diurnal nature, and to work and be active at times that they should actually relax, which is also known as desynchronization of the circadian periodic functions (Folkard 1996). In general, there are three types of consequences that have been studied in relation to shiftwork, and particularly to rotating vs. fixed shifts: (1) physical health variables; (2) family and social variables; and (3) organizational variables (Blau and Lunz 1999).

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Among the *physical health* variables, sleep problems, gastrointestinal and psycho-vegetative disorders count as the most frequently studied (e.g., Nachreiner *et al.* 1995, Costa 1996), whereby employees who work in rotating shifts report more physical health complaints than those with fixed shifts (Åkerstedt 1985). Not surprisingly, former shiftworkers (those who have left shiftwork due to health complaints) tend to show more signs of ill-health than present shiftworkers (Frese and Semmer 1986). The negative impact of shiftwork on health is mainly attributed to the disturbances of the normal circadian rhythms of physiological functions (e.g., Nachreiner *et al.* 1995).

Shiftwork has been related to *family and social* problems such as higher work/nonwork conflict (Staines and Pleck 1984, Bohle and Tilley 1989), and diminished leisure activities (Walker 1985), participation in voluntary organizations (Jamal 1981), education of the children (Diekman *et al.* 1981) as well as reduced spouse satisfaction (Smith and Folkard 1993). With regard to family or social problems, research findings are contradictory since some studies find work-nonwork conflict among workers with rotating shifts (Bohle and Tilley 1989), while others find more problems among those working fixed shifts (for instance, afternoon or even morning shifts; Shamir 1983). Although the actual amount of spare time a shiftworker has may be equal to or even greater than that of a non-shiftworker (Knauth 1987), the *positioning* and therefore the utilization potential of spare time may be less favourable. As has been demonstrated by Baer *et al.* (1981, 1985) and Wedderburn (1981), there is a distinct pattern in the value of free time depending on its chronological position in the day and in the week. 'Wednesday is not Saturday', noted one of Sergean's (1971) shiftworkers. During the working days, evening hours have the highest utility (because of various social activities during the evening), whilst during the weekend, both morning and afternoon hours have a high utility and value (Baer *et al.* 1981, 1985). This agrees with the general characterization of Western society as an evening and weekend society (Neuloh 1964), and points to another problem of shiftwork: interference of the working time with the rhythms of social life (Baer *et al.* 1981).

The third category of outcomes, the *organization* related variables, include attitudes like job satisfaction, organizational commitment and intentions to quit (turnover) (Jamal 1981), but also job stress or burnout (Kandonlin 1993), job performance and the prevalence of accidents (Monk and Folkard 1985). Rotating shift workers are expected to hold less positive job attitudes (e.g., job satisfaction, organizational commitment) than fixed shift workers, because the first group has to adjust more often to changing work demands and environments (Jamal 1981). Again, whereas some studies find that rotating shift workers have less favourable job attitudes than fixed shift workers (e.g., Jamal 1981), other studies report the opposite (Barton 1994).

The often reported inconsistent results concerning the effect of shiftwork might be due to the focus on whether the shifts are rotating or fixed with the ignorance of the positioning of working hours, that is, whether or not the valuable weekend or evening hours are included (i.e., the *highly valued hours*). This is mainly done in order to gain a large enough sample size to allow comparisons (Blau and Lunz 1999). In the current study attention is paid to both the *pattern* of days worked (i.e., fixed vs. rotating) and the *positioning* of the working hours (i.e., day shifts vs. evening shifts including weekend). Staines and Pleck (1984) have also examined the impact of similar work schedule characteristics on the quality of family life. As their study showed, the differentiation between the pattern of working days and the positioning of working hours is sufficient to detect the effects of shiftwork on family variables. In

the present study work–home conflict and home–work conflict are included, which concern conflicting demands made upon time and/or effort resources in the two domains (Greenhaus and Beutell 1985). In addition, the study examines the impact of shiftwork on several organizational variables (i.e., job attitudes) and health indicators. Since the main focus of the present study is not to investigate the effects of shiftwork on specific health problems, a further discrimination of other types of permanent shifts, for instance night work, is not necessary.

The study was conducted utilizing the total population of military police in The Netherlands. Military police represent an occupational group that experiences high stress, with family problems, alcohol use and self-reported medical maladies being the three prominently identified correlates of experienced stress (Smith and Ward 1986). To the authors' knowledge, even though this group of professionals is required to perform shiftwork (e.g., 24-h readiness shifts), the effects of shiftwork have not been studied among them. A main advantage of this occupation is that it contains jobs, in which can be found groups with rotating shifts and groups with fixed shifts, including day, non-shiftwork simultaneously. Comparisons between shiftworkers and dayworkers in similar jobs are generally overlooked in shiftwork research (see also Bohle and Tilley 1989, Beermann and Nachreiner 1995), but such comparisons allow control of the impact of job characteristics on the relationship between shiftwork and various outcome measures.

The central research question is whether working in fixed or rotating shift and during socially valuable hours (weekends and evenings) or during daytime is related to higher work–home conflict, elevated levels of burnout and negative job attitudes (job satisfaction, organizational commitment and turnover intentions) as well as to impaired general health and absenteeism. The study particularly focuses on an examination of the relative contribution of the pattern of working hours (i.e., rotating vs. fixed shifts) and of the position of working hours (including weekends and evenings or daytime) in explaining the outcome measures.

2. Method

2.1. Sample and procedure

A questionnaire was sent in November 2000 to the home addresses of all employees of the Dutch Military Police force. The survey was carried out on request of this organization, with the goal to assess and improve human resource management policy and practice. The Dutch Military Police conduct a variety of mainly policing tasks, such as border control, surveillance, criminal investigation and protection of objects and persons. At the time of the study, the organization had 5254 employees, mostly military (4925) and a relatively small group of non-military staff (329). Over 72% of all employees had a permanent contract, whereas almost 28% had a temporary contract, typically for 5 years. Participation was voluntary, resulting in a response of 61% (3122 persons). The sample consists of mainly men ($n = 2863$) and 259 women, which is typical for Dutch military and policing organizations. The mean age is 36 years ($SD = 9.5$ years), and respondents were working for this organization for a mean of 14 years (ranging from 0–37 years). The sample can be seen as representative regarding all relevant demographic and background aspects for the whole population. Almost 55% did not work in the morning shift and only 32.5% were never required to work during evenings or weekends. The shift rosters ranged from 24-h shifts to 16-h shifts or 8-h shifts and were variable within the population.

2.2. Measures

Burnout was measured with the Dutch version (Schaufeli and Van Dierendonck 2000) of the MBI-General Survey (Schaufeli *et al.* 1996). The instrument includes 16 items that measure the three components of burnout: exhaustion, cynicism and reduced professional efficacy. Exemplary items are: 'I feel used up at the end of the workday' (exhaustion), 'I have become less enthusiastic about my work' (cynicism), and 'In my opinion, I am good at my work' (professional efficacy). The items were scored on a 7-point scale (0 = never, 6 = always).

General Health was assessed using the item 'In general, do you feel healthy?' from the VOEG (Dirken 1969, Martens *et al.* 1999), a well-validated Dutch inventory. The complete inventory includes 23-items that assess psychosomatic health complaints (e.g., stomach troubles, dizziness, backaches, tiredness, heart complaints, shortness of breath). Preliminary analysis using data from 1090 employees working in three other organizations showed that the general item has a mean correlation of 0.52 with the other, specific items. Participants could respond on a four-point scale ranging from seldom or never (1) to very often (4).

Absenteeism was assessed with one open question, namely: 'During the last 12 months, how many working days did you not work because of illness?' Respondents could report the total number of days they had been absent. Since the absenteeism measure was not normally distributed (kurtosis and skewness > 5), a logarithmic transformation was conducted before entering this variable in the analysis.

Job satisfaction was measured with three items based on Van Veldhoven and Meijman (1994, see also De Jonge *et al.* 2000), namely: 'I am satisfied with my current work', 'I usually have a lot of pleasure in my work', and 'Overall, I am very satisfied with my job'. It has been shown that such a global rating of overall job satisfaction is an inclusive measure of general job satisfaction (Wanous *et al.* 1997).

Commitment refers to the relationship of employees to the organization in which they work. It was measured with the seven items of Mowday *et al.*'s (1979) affective commitment scale. An exemplary item is: 'I tell my friends and family that the Dutch Military Police is a pleasant organization to work for' (1 = totally disagree, 5 = totally agree).

Turnover intentions were assessed with three items from Van Veldhoven and Meijman's (1994) inventory. An exemplary item is: 'Now and then I think about changing jobs' (1 = totally disagree, 5 = totally agree).

Both *work-home conflict* (WHC) and *home-work conflict* (HWC) were operationalized using four and three items respectively from the 'Survey Work-home Interference NijmeGen' (SWING, Geurts 2000). Work-home conflict (home-work conflict), can be defined as a process in which one's functioning and behaviour at home (work) is negatively influenced by demands made upon time and effort in the work (home) domain. Example items are: 'How often does it happen that...' '...you find it difficult to fulfil your domestic obligations because you are constantly thinking about your work?' (WHC), '...you have difficulties to concentrate on your work because you are preoccupied with domestic matters?' (HWC). The items were scored on a five-point-scale (1 = never, 5 = always).

2.3. Data analysis strategy

The strategy followed in the present study was to look for different generalized patterns of health, job attitudes and work-home interference, by examining the

differences between employees that worked fixed or rotating shifts during the day or including weekends/evenings. This yielded the following target groups for the discriminant analysis: (1) fixed-day work; (2) fixed non-day work including weekends; (3) rotating without weekends; and (4) rotating including weekends. If these four combinations are related to health, job attitudes and interference between work and home, it should be possible to separate the four groups by means of discriminant analysis on the basis of their answer patterns to questions about health (i.e., burnout, general health and absenteeism), job attitudes (i.e., job satisfaction, organizational commitment, and turnover intentions), and the work–home interface (i.e., work–home conflict and home–work conflict). This type of statistical analysis offers the advantage of making use of the common variance of the individual aspects of health, attitudes and conflict between work and home, thus ignoring singularities that might otherwise blur the picture. If, on the other hand, there is no significant difference in the effects of the fixed vs. rotating shifts or of day vs. non-day work including weekends, no discrimination based on the reported health, job attitudes and conflict between work and home should be possible.

3. Results

Table 1 displays the mean scores of the four groups on all dependent variables as well as the effects of the factors Rotation, (fixed vs. rotating shift), Timing (day vs. non-day shift including weekends) and the interaction term (tested by means of multivariate analysis of variance—MANOVA). Since it is possible that the effects of the shiftwork factors Rotation and Timing are confounded by some demographic and background characteristics, these characteristics were simultaneously controlled for. More specifically, gender, age, family status, education, job position, and type of contract (full or part-time) were entered as control variables in the MANOVA. As can be seen in table 1, Rotation had significant main effects on exhaustion, cynicism, job satisfaction, commitment and self-reported absenteeism. As expected, workers with rotating shifts report a higher level of cynicism, lower levels of job satisfaction and commitment and a higher number of absence days. Note, however, that workers with fixed shifts reported more feelings of exhaustion than their rotating counterparts. Furthermore, Timing (day vs. non-day shift including weekends) had main effects on WHC and absenteeism. Day workers reported a higher number of absence days, but lower WHC than employees who worked evenings and weekends. Interestingly, the Rotation \times Timing interaction achieved the level of significance for WHC ($F(1, 2890) = 10.43, p < 0.001$) and for job satisfaction ($F(1, 2890) = 4.22, p < 0.05$). Figure 1a displays the mean scores for the four groups for WHC. Workers with fixed non-day shifts including weekends experience the highest level of WHC, followed by those with rotating shifts (with and without weekend included). Those who work only fixed day shifts report the lowest level of WHC. Moreover, as figure 1b shows, employees with fixed shifts report higher job satisfaction than those with rotating shifts, whereas those with rotating shifts including weekends report lower satisfaction than their counterparts with rotating shifts, but without weekends. Note here that the group with rotating shifts without weekends included only 40 employees, while all the other groups were substantially larger (day workers $n = 941$, workers with fixed non-day shifts $n = 422$, shiftworkers including weekends $n = 1624$).

To examine whether it would be possible to discriminate the four groups on the basis of WHC, HWC, job attitudes, burnout, general health and absenteeism,

Table 1. Mean scores of the four shiftwork groups and multivariate F-values of the factors rotation, timing and their interaction (after controlling for the gender, age, family status, education, job position, full or part-time contract)

	Fixed		Rotating		F-value		
	Day (<i>n</i> = 897)	Non-day/weekends (<i>n</i> = 396)	Day (<i>n</i> = 34)	Non-day/weekends (<i>n</i> = 1557)	Rotation (fixed vs. rotating)	Timing (day vs. non-day)	Interaction
Exhaustion	1.71	1.75	1.51	1.43	4.61*	0.18	0.62
Cynicism	1.62	1.50	2.03	2.10	15.00***	0.15	1.06
Competence	4.35	4.47	4.20	4.11	3.59	0.00	2.51
WHC	1.82	2.30	1.98	2.05	0.03	15.90***	10.43***
HWC	1.40	1.41	1.39	1.43	0.01	0.39	0.06
Job satisfaction	3.72	3.81	3.57	3.37	6.38**	0.12	4.22*
Commitment	3.16	3.06	2.87	3.02	3.93*	0.15	2.79
Turnover intentions	2.57	2.73	2.88	2.91	0.59	0.17	0.06
General health complaints	3.52	3.57	3.55	3.55	0.00	0.03	0.19
Absenteeism	10.26	7.19	18.04	8.14	7.39**	6.21**	3.08

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

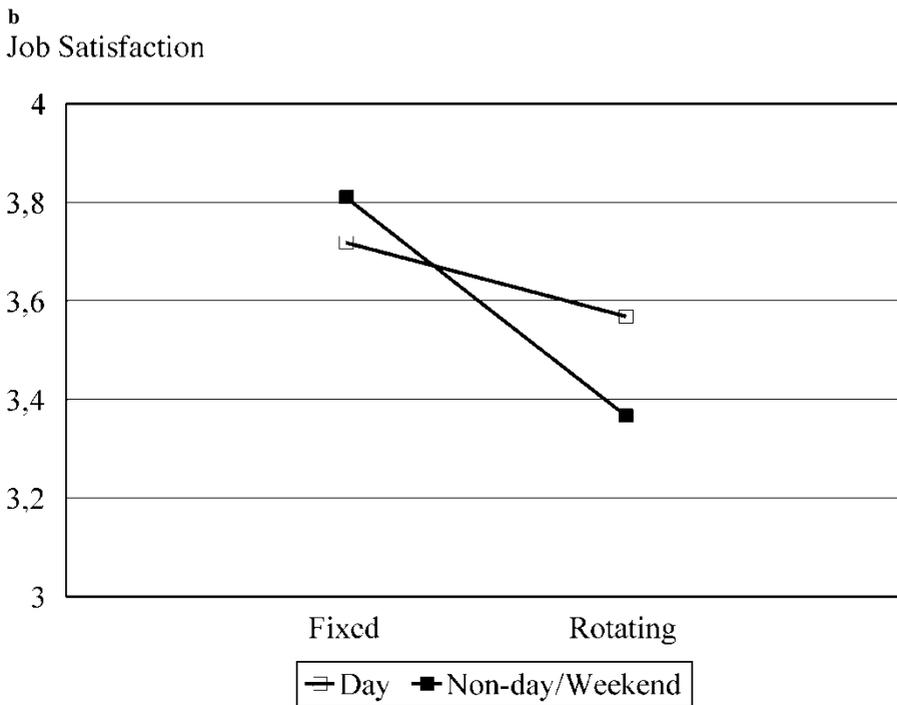
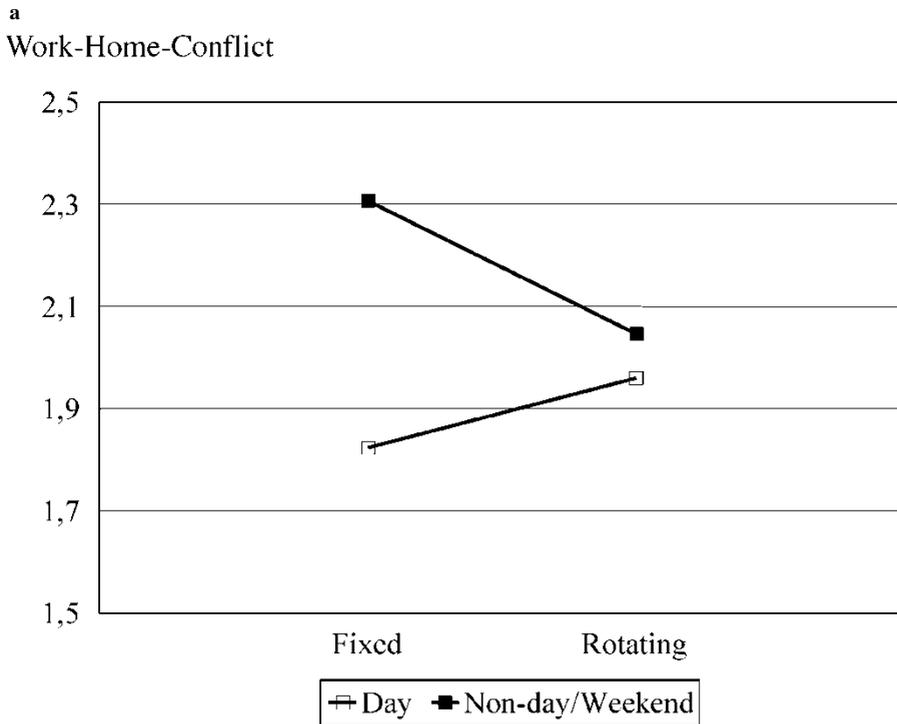


Figure 1. (a, b) Mean scores of the four shiftwork groups on Work –home-Conflict (a) and Job Satisfaction (b).

a discriminant analysis was carried out. Results revealed a significant separation of the four groups (Wilk's $\lambda = 0.81$, $\chi^2(30) = 647.45$, $p < 0.001$). More specifically, *two* discriminant functions were significant for an optimal discrimination between the four groups. The eigenvalue of the first discriminant function was 0.15 and the canonical correlation was 0.36. For the second discriminant function, these values were 0.08 and 0.27, respectively. The standardized canonical coefficients for the discriminating variables in the discriminant functions are displayed in table 2.

As can be seen from the plot of group centroids in figure 2, the first discriminant function clearly discriminates between rotating vs. fixed shift systems, while the second discriminant function separates those who work during the day from those who work evenings and weekends. Overall, 50.3% of the total sample could be classified correctly indicating that the classification by these discriminant functions is obviously superior to a random assignment based on prior group membership probabilities. In the case of random assignment, 25% of the sample would have been classified correctly (cf. Tabachnik and Fidell 1989).

Table 2 shows that the first canonical variable represents basically the three burnout dimensions (with absolute loadings varying from 0.33 to 0.55) and job attitudes (with absolute loadings varying from 0.20 to 0.55), while the second canonical variable includes mainly WHC (loading = 0.76). Absenteeism and general health have very low loadings on both canonical variables ($< |0.12|$). If loadings $> |0.30|$ are considered as substantial, the resulting pattern of loadings indicate that the three burnout dimensions, job satisfaction, turnover intention and WHC are the most important discriminating variables. Thus, the first canonical variable—discriminating rotating from fixed shift systems—contains features that are related to more favourable scores for the fixed shift workers, that is more job satisfaction, lower turnover intentions, a lower level of cynicism and a higher level of professional efficacy. An exception to this is the level of exhaustion, which is higher for the fixed shift workers. Particularly noteworthy is that the second canonical variable—separating day work from non-day work including weekends—is mainly characterized by negative work-home conflict since the canonical loading is 0.76, whereas the loadings of all other variables included have values lower than 0.21. Moreover, features like HWC, organizational commitment, but also general health and

Table 2. Standardized canonical coefficients for all variables in the discriminant functions ordered by absolute size of correlation within function, $n = 3027$

	Function	
	1	2
Job satisfaction	0.55	0.20
Cynicism	-0.55	-0.19
Professional efficacy	0.41	0.21
Turnover intentions	-0.38	0.14
Exhaustion	0.33	0.09
Organizational commitment	0.20	-0.12
Home-work conflict	-0.07	0.04
Work-home conflict	-0.19	0.76
Absenteeism	0.08	-0.12
General health complaints	-0.03	0.11

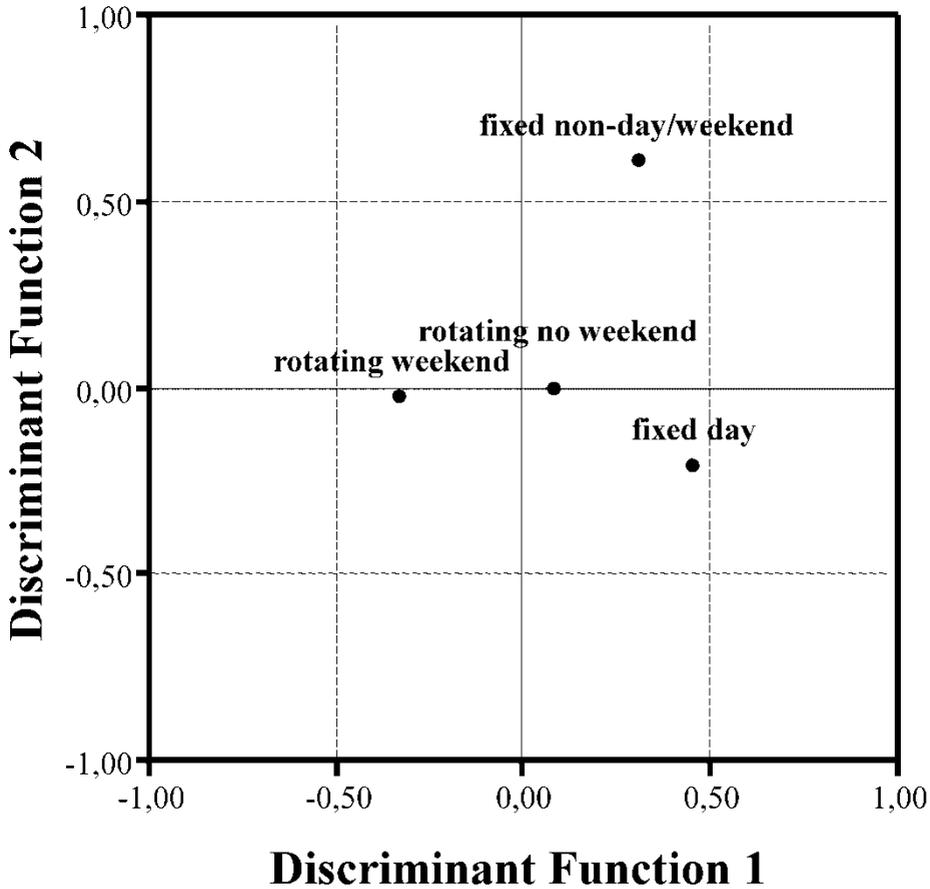


Figure 2. Group centroids for the four shiftwork groups in a two-dimensional space.

absenteeism were not able to discriminate among the four groups, because their loadings on the discriminant functions were < 0.20 .

Since positive values in a discriminant function mean overrepresentation of the respective canonical (or discriminant) variables and negative values mean an underrepresentation of these variables, figure 2 can be interpreted as follows: Employees with fixed non-day shifts including weekends are characterized by relatively high levels of job satisfaction, professional efficacy and exhaustion, relatively low levels of cynicism and turnover intentions, in combination with the experience of a relatively high level of WHC (because they are located in the quadrant where both discriminant functions are positive). Employees who have fixed day shifts are characterized by relatively high levels of job satisfaction, professional efficacy and exhaustion, relatively low levels of cynicism and turnover intentions (cf. positive values on first discriminant function), in combination with a relatively low level of WHC (cf. negative value on second discriminant function). Furthermore, the distinctive characteristic of employees that have *rotating* shifts including weekends is the experience of relatively high levels of cynicism and turnover intentions and relatively low levels of job satisfaction, professional efficacy and exhaustion (cf.

negative values on the first discriminant function). Remarkably, this group has a zero-value on the second discriminant function indicating that WHC does not discriminate this group from the other groups. The final group of employees that works rotating shifts without weekends included could not be discriminated from the other groups by the present variables under study since it has almost zero-values on both discriminant functions. Note, however, that this group included only 40 cases, while all the other groups were substantially larger.

Finally, figure 3 shows the proportion of participants that were classified correctly on the basis of the discriminating variables, as well as the proportion of false

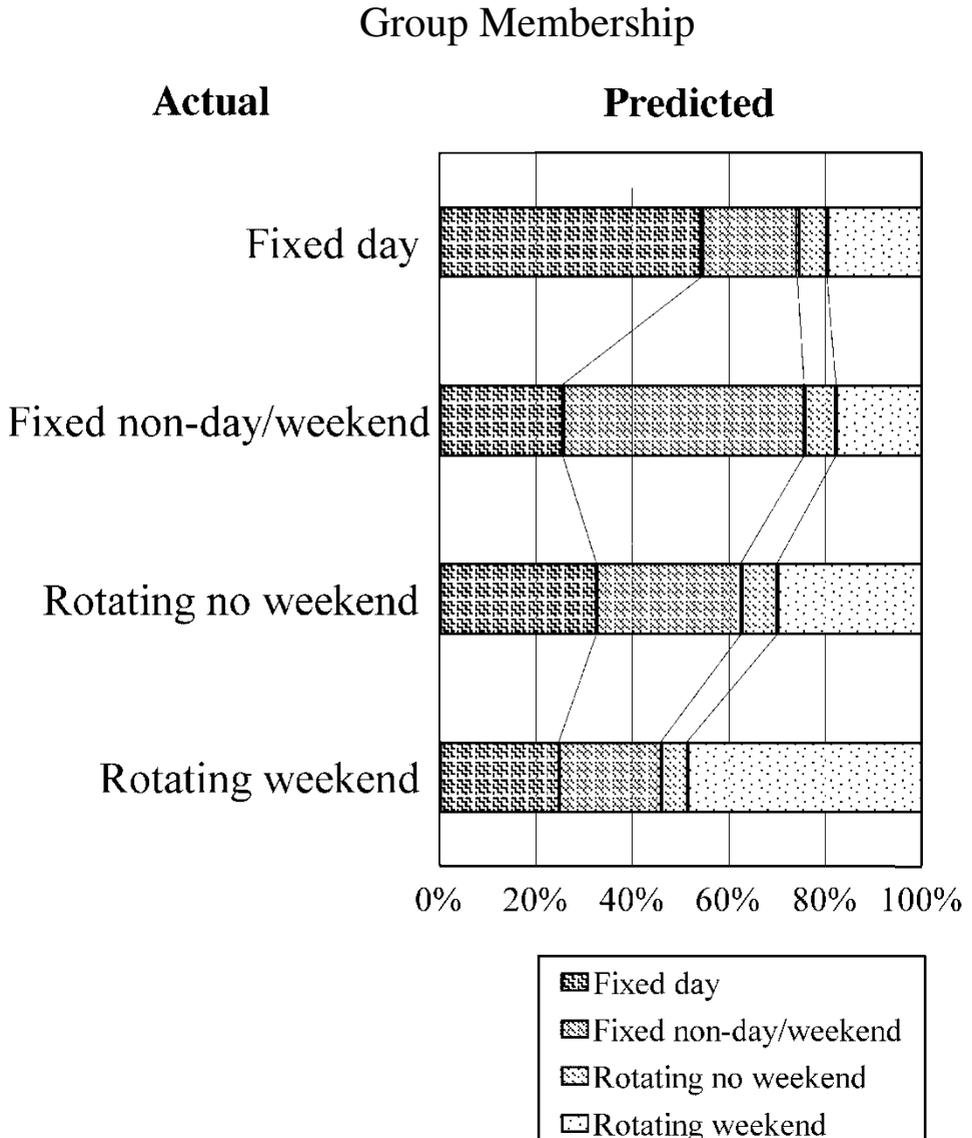


Figure 3. Results of classification procedure.

classifications. As can be seen, the best prediction can be made for fixed day work (54% were classified correctly), and the worst prediction is made for rotating work without weekends. Only three of the 40 members (7.5%) of this latter group could be classified correctly, while the other 37 members were equally distributed among the other groups. Furthermore, figure 3 shows that except for the group with rotating shifts without weekends, for all other groups the proportion of correct classifications is substantially higher than the proportion of wrong classifications or the proportion that could be expected from a random assignment to each of the four groups (i.e., 25%).

4. Discussion

The aim of the present study was to examine the relationship between two parameters of shiftwork, namely (1) the fixed or rotating pattern of days worked and (2) the positioning of the working hours (i.e., including weekend shifts or not) on the conflict between work and home, several job attitudes and health indicators. On the basis of these two shiftwork parameters, four groups were created and discriminated using their response patterns on the outcome measures. This study was conducted among the total Dutch population of the Military police, with the advantage that shift and day workers were working in jobs with identical or at least comparable tasks and working conditions. It was found that work schedule aspects have a considerable effect on experienced work-home conflict, job attitudes and health. Such effects exist in spite of the assumed operation of self-selection and adaptation processes in regard to work schedules (Shamir 1983). Specifically, the results showed that working rotating shifts had different effects on the dependent measures included than working fixed shifts. Workers with rotating shifts (including weekends) experienced more negative attitudes towards their jobs than employees who worked fixed shifts (with or without the weekend included). Moreover, working in fixed non-day shifts including weekends was related to the experience of more work-home conflict than having fixed daywork or rotating shifts with or without the weekends included.

The findings of the present study support, in general, the conclusions of previous studies: workers assigned to *rotating* shifts (including weekends) report more negative attitudes towards their jobs than workers who are *permanently* assigned to day, afternoon, or even evening shifts (Jamal 1981). Irrespectively of whether employees worked during day hours or during hours in the evening, night and/or the weekend, those with fixed shifts reported higher job satisfaction and professional efficacy and lower cynicism and turnover intentions than employees with rotating shifts. A notable finding is that workers with rotating shift schedules did not have a diminished subjective general health compared to fixed shift workers, as is often reported in the literature (e.g., Nachreiner *et al.* 1995), but only unfavourable attitudes towards their jobs. This might be due to the measure of health used, which was a general question without asking for the specific symptoms that are typically prevalent among shiftworkers. Indeed, the burnout dimensions (representing more specific symptoms) were able to discriminate among the groups. On the other hand, in an unreported analysis it was found that the factors rotation and timing of shifts were unrelated to the consumption of coffee, alcohol and cigarettes, which can be viewed as further indicators of health behaviour (Knauth and Costa 1996). A more plausible explanation is that of a selection effect, also known as the 'healthy worker effect', whereby those who have developed health

complaints during shiftwork have left this type of work and moved towards the more regular daytime work. As a consequence, the sample of rotating shiftworkers is a relatively healthy and strong group. Another explanation is that shift workers, more than day workers, regard their health complaints as a 'natural' component of their work situation (they are more or less used to some level of physical discomfort), and therefore tend to underestimate their complaints (see Thierry and Jansen 1998).

In a similar vein, self-reported absenteeism was insufficient in discriminating among the different work time arrangements. Previous studies were also not able to find consistent relationships between work time schedules and absenteeism (e.g., Taylor and Pocock 1972). A tendency can be seen for military police officers who have only dayshifts to be more often absent than their counterparts with non-day shifts (including weekends/evenings), which has often been found in previous studies on shiftwork and absenteeism (see Thierry and Jansen 1998). These findings can be explained by the previously discussed 'healthy worker effect', as well as by the adaptation of shiftworkers to physical discomfort. Costa (1996) gives some additional explanations, for instance, absence spells of day workers might be more often due to late arrivals since they travel during rush-hours or because of short-leaves for appointments that can only be made during the daytime (e.g., dentist). Furthermore, shiftworkers exhibit greater solidarity towards their shift hand-overs and therefore avoid being absent unexpectedly (see also Thierry and Jansen 1998).

An interesting finding of the present study is that work-home conflict was the only variable that discriminated between employees who worked fixed non-day shifts including weekends from those who worked fixed dayshifts. Work-home conflict was, however, irrelevant to whether or not employees were working in rotating shifts. This result agrees with Shamir's (1983) finding that workers on a rotating shift scored lower on work-home conflict than those working in fixed shift (during afternoons or mornings). A tentative explanation is offered of why elevated levels of work-home conflict can be found particularly among employees with fixed non-day shifts (including weekends), and not to the same extent among workers with rotating shifts (including weekends). Working fixed evenings (and nights) including weekends implies that these employees are *permanently* inhibited from being with the family during so-called highly valued hours, where family and social activities are more likely to take place (cf. Wedderburn 1981). Studies on the free time that shift workers have in common with other family members (particularly children) seem to justify this explanation. For instance, the study of Volger *et al.* (1988) revealed that during the week that contained fixed evening shifts, shift workers with children in the secondary school or in the high school had only 17 and 23 common free hours with their children respectively. When they had rapidly rotating shifts the amount of common free time increased to 28 and 37 h respectively, while for day workers these hours reach the span of 43 and 60.

In addition to general health and self-reported absenteeism, organizational commitment and home-work conflict were also not able to discriminate between the various work schedules. The lack of impact of shiftwork parameters on commitment towards the organization has been found also in other studies, for instance among medical technologists (Blau and Lunz 1999). Home-work conflict is primarily related to home characteristics rather than to characteristics of work, and it is therefore not surprising that it is irrelevant to the work-time pattern (Frone *et al.* 1992).

Contrary to the authors' expectations, exhaustion was more prevalent among employees in fixed work patterns (with or without weekends/evenings) than among those in rotating shifts. Apart from the previously discussed 'healthy worker effect' which might also explain the higher level of exhaustion among fixed shift workers, this result might be explained by differences in the working conditions between fixed and rotating shifts, for instance in work demands which are highly related to exhaustion (Demerouti *et al.* 2001). Rotating shifts including weekends might allow alternating between demanding and less demanding shifts, and thus might alleviate feelings of exhaustion. In addition, rotating shifts are, compared to fixed shifts, usually less tightly supervised, and have less strenuous tasks (Frese and Semmer 1986).

Finally, the results revealed that the various indicators of job attitudes, health and conflict between work and home were not sufficient in discriminating employees with rotating shift systems without weekends from the other possible shift work groups. This group of employees could not be clearly classified to one other group (which would correspond to similarities in the reported symptoms), but were distributed among all three shift-groups. This was because either this group was too small to be reliably discriminated from the other groups, or this group did not have a clear pattern of symptoms, at least what concerns the symptoms included in the study. Future studies should give some attention to the possible indicators that might discriminate the rotating shift workers (weekend not included) from other type of shiftworkers.

One of the limitations of the study concerns the fact that it was not possible to separate employees who work primarily during evening hours from those who work primarily during weekends (but not necessarily during evenings). Notwithstanding this limitation, this study, based on the total population of military police, has some important implications. The findings uncovered the importance of working permanently during evening and/or weekend hours for the experience of conflict between work and home. This finding has important implications for roster design. Where regular evening, (night) and weekend work is required, it is highly advisable to develop rosters that impose minimum disruption on highly valued leisure time that people usually need for domestic obligations and family or social activities, and that provides maximum opportunity for swapping shifts in order to facilitate nonwork activities (see also Bohle and Tilley 1989). The results suggest the recommendation to avoid permanent non-day and weekend shifts in order to preclude the experience of work-home conflict, which is detrimental for employees, their families and in the end for organizations. The possible alternative, namely working in rotating shifts, seems to prevent this conflict to some extent, but is linked to having more negative attitudes towards the job. Therefore, if work in rotating shifts or during socially valued times (evenings and weekends) cannot be abolished, then other alternatives have to be worked out. As Baer *et al.* (1985) showed *the* optimal shift schedule that minimizes the social risks for all employees does not exist, because the degree of disruption of social life through a specific shift system depends highly on the individual preferences and leisure time usefulness of the target employee. Similar to the ergonomics approaches of work-place design, the design of shift schedules should be orientated to specific groups of employees that are normally employed in (military) police work by integrating the subjective evaluation of the utility of the (daily and weekly) leisure hours. Furthermore, flexibility (i.e., variability) of

shift plans with respect to the length, position and distribution of the working time (see Nachreiner and Grzech-Sukalo 1997) may be another way to facilitate the adjustment of shift work to individual preferences and needs. As a consequence, job satisfaction and positive attitudes towards the job and the work time arrangements might increase.

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