

Gender differences in sleeping hours and recovery experience among psychiatric nurses in Japan

Narumi Ooshige

Professor, Japanese Red Cross Kyushu International
College of Nursing
Fukuoka, Japan
e-mail: n-ooshige@jrckicn.ac.jp

Mitsuyo Nakashima

Associate Professor, Faculty of Medicine, School of
Nursing, Fukuoka University
Fukuoka, Japan
e-mail: mnakashima@adm.fukuoka-u.ac.jp

Takuro Tobina

Senior Lecturer, Faculty of Nursing and Nutrition,
University of Nagasaki, Japan
Nagasaki, Japan
e-mail: tobitaku@sun.ac.jp

Tae Yamaguchi

Senior Lecturer, Department of Nursing, Faculty of Nursing
and Nutrition, University of Nagasaki
Nagasaki, Japan
e-mail: tae0813@sun.ac.jp

Kazuo Minematsu

Associate Professor, Department of School Health,
Graduate School of Education, Nagasaki University, Japan.
Department of Public Health, School of Medicine,
Juntendo University, Japan
Nagasaki, Japan
e-mail: minematsu@nagasaki-u.ac.jp

Noriaki Tsunawake

Professor, Faculty of Nursing and Nutrition, University of
Nagasaki, Fukuoka, Japan
e-mail: tsunawake@sun.ac.jp

Abstract— In their attempts to balance sleep routines with service schedules, nurses working in shifts are at risk for developing sleep disorders. Furthermore, nurses often experience considerable stress. In recent years, research has acknowledged the importance of activities other than work, and in particular recovery experiences. Therefore, the current study aimed to explore gender differences in sleeping hours and recovery experience of psychiatric nurses from a 16-hour shift to two days off duty. We found that males went to bed late and that females rose slightly early on days where they worked night shifts. On average, the sleeping hours of males were about 2 hours longer than were those of females. Furthermore, sleeping hours was positively related to mastery in males, while in females working hours was negatively related to psychological detachment and relaxation. Before the night shift, females engaged more housekeeping and used short sleeping hours during rest to compensate for the lack of sleep. Thus, recovery experience had different relationships with various life activities between male and female nurses. The results highlighted the need for health management interventions for nurses working in shifts that consider sex differences.

Keywords-component; gender differences; sleeping hours; night shift; life activity; psychiatric nurses.; recovery experience

I. INTRODUCTION

The sleep cycle of people working in shifts is often disrupted, as it is difficult to maintain the sleep-wake rhythm because of their service schedules; this makes them prone to developing sleep disorders [1] [2]. Although sleep is affected by various elements such as age, biological factors, environmental agents, and psychosocial factors, the secretion

of a particular hormone in females causes the biggest difference in sleep patterns [3]. Adult females' sleeping hours are shorter than are those of males, and females tend to engage in housekeeping chores more than do males [4], especially if they are in the early stages of their job training. This could be one reason that they rise earlier than do males on average [5]. Other reasons could be differing bedtimes and time taken to care for the body [4]. However, when it comes to nurses working night shifts, research on gender differences in sleeping hours is lacking.

There is clear evidence that shift-working nurses show a greater degree of fatigue than do non-shift-working nurses [6]. Thus, the recovery from such fatigue is an important issue for shift-working nurses.

In recent years, researchers have begun exploring recovery experiences, which are activities that help restore psychosocial resources to original levels after stressful experiences and that are outside of working hours [7]. Recovery experiences have four main characteristics: psychological detachment, relaxation, mastery, and control. Psychological detachment refers to a state of being physically and mentally separated from one's work, such that the individual does not consider work matters or problems. Relaxation refers to the state of intentionally reducing the activity of both the mind and body. Mastery refers to self-education during leisure time. Finally, control refers to the degree to which an individual can manipulate how leisure time is spent [7]. Past research has indicated that recovery experiences can improve work performance [8], as well as enable greater recovery of fatigue.

Thus, recovery experiences might be helpful for the stress management of shift-working nurses.

Currently, there has been no exploration of the gender differences in recovery experience. Thus, the present study aimed to clearly illustrate the differences in sleeping hours and life activities between night shift days and days off of double-shift-working nurses, and the differences in recovery experiences between males and females.

II. MATERIALS AND METHODS

A. Participants

Participants were 26 nurses from the psychiatry specialty who worked two-shift rotation. There were 19 females with an average age of 37.9 years, and 7 males with an average age of 38.1 years. The male to female ratio in this study mostly reflects that of A hospital (where this study took place), wherein around 42.4% of all nurses are males.

B. Research Period

The duration of the research was from October 2015 to March 2016.

C. Instruments

Data were collected across six days where participants were engaged in night shifts, as well as on two consecutive days that they were not on duty (i.e., their days off). Physical activity levels (steps and energy expenditure) were measured using the body activity meter by Actimaker (EW4800, Panasonic, Japan) during the aforementioned study period. This recorded the number of steps (i.e., amount of body activity). The activity schedule (life activities) for the night shift and the days off included sleep, meals, work, housework, conversation and social engagements, leisure, sports and hobbies, internet, TV, video, and rest, and was considered as the statement of interval for 15 minutes. The life activities before a night shift targeted the life activities from midnight (0:00) after a day shift to 16:00 of the day of the night shift. To measure recovery experience, we employed the Japanese version of the Recovery Experience Measure [9].

D. Data analysis

Data recorded included the participants' rising time during the two days off, bedtime, number of sleeping hours, time spent in each life activity, age, years of experience, whether they had children, commuting time, and number of work hours during the night shift. The data of males and females were compared using an unpaired t-test and chi-square test. To measure body activity, the number of steps was recorded and compared across males and females. Furthermore, a repeated-measures two-way ANOVA was used to compare gender differences in sleeping hours for night shifts and days-off. When an interaction was significant, we performed a simple main effect analysis to determine precise differences. The average mark of four subscales of recovery experience was compared using an unpaired t-test. Next, the relationship between sleeping hours, life activities and recovery experience were computed using Spearman's correlation coefficient.

SPSS Statistics for Windows 22 was used for all analyses, and the significance threshold was set at .05.

D. Ethical Considerations

Using a document outlining the purpose and design of the research, the study process was explained to the person in charge of the medical institution. Consent was obtained from this individual.

In addition, this research was approved by the Japanese Red Cross Kyushu International College of Nursing research ethics screening committee (approval number 15-102).

III. RESULTS

A. Participant demographics

The average number of years of clinical experience did not differ between females and males (13.5 for females vs. 15.7 for males; $P=n.s.$). The average commuting time was 24.8 minutes for females, 37.1 minutes for males. The average naptime during a night shift for females was 83.6 minutes, and for males it was 111.4 minutes. About 30% of participants of both genders had a child (while 70% did not), and the difference was not significant. ($P=n.s.$) (Table 1).

B. Comparison of sleeping time and sleeping hours

Males went to bed later than did females on both days-off and night shift days. Females rose earlier than did males ($P<.05$). Males also slept longer (by about 2 hours) than did females, on average ($P<.05$). There was no difference between males and females in the following variables: bedtime, rising time, and sleeping hours on days off (Table 2).

C. Comparison of body activities (number of steps)

There were more males than females on duty during the night shift, and the number of steps after a night shift was higher for males. There were many more males on the first day off, while there were many more females on the second (Table 3).

D. Comparison of life activity

As for life activities on days off, we found differences between males and females only when the day off was before a night shift ($P<.05$). Specifically, males and females differed in terms of the sleeping hours, general housekeeping, and rest time before a night shift; females spent more time sleeping and engaged in housework, while males had more rest time ($P<.05$) (Table 4).

E. Main effects

There was a main effect ($F[1, 23] = 1.207, P=n.s.$) of progress of sleeping hours, but no significant main effect of gender. There was a significant interaction between gender and progress of sleeping hours ($F[2, 46] = 4.28, P<.05$) (Fig. 1), so a simple main effect analysis was performed. The results revealed that for females, there were no significant differences in sleeping hours ($F[2, 46] = 0.482, P=n.s.$); however, males showed significantly more sleeping hours on days-off before a night shift ($F[2, 46] = 8.06, P<.05$).

E. Comparison of recovery experience

For all four subscales, although there was no difference between males and females, females showed slightly higher mastery and control scores (Table 5).

G. Relation of recovery experience and life activities

Among males, mastery was positively correlated with sleeping hours on the second day off ($r=0.891$, $P<.01$). Among females, psychological detachment was negatively correlated with work-related activities on the first day off ($r=-0.476$, $P<0.01$). A similar negative correlation was found for relaxation and work-related activities on the first day off ($r=-0.570$, $P<.01$) (Table 6).

IV. DISCUSSION

The males in this study comprised of 27% of the whole sample, which is more than the ratio of male nurses in the country (8.3%), as indicated by a national investigation. Moreover, there were no significant gender differences in average age and years of clinical experience; thus, age was considered to have little influence on the results.

We can also compare sleeping hours before and after night shifts and life activities with 30-year-old people from the general population. In the current study, the average sleeping hours for males were 8.4 hours on days-off, 7.1 hours on weekdays, and 10.3 hours (623 minutes); for males in the general population [10], it was 8.3 hours (502 minutes) on the second day-off and 7.8 hours (468 minutes) on the first day-off. Thus, it seems that males tend to have greater hours of sleep on days before night shifts.

Similarly, for females in this study, the average sleeping-hours were 7 hours on a weekday and 7.5 hours on a day off. Furthermore, females took 8.1 hours (490 minutes) in this study; 7.9 hours (476 minutes) are taken on the first day off. The sleeping hours of each female in the study were longer than their contemporaries in the general population, having 8.5 hours (517 minutes) on the second day off. In a study with people working in double shifts [11], the researchers found that on average, naps were taken for 1.85 hours (111 minutes), and the average number of sleeping hours following night shifts was 9.18 hours (550 minutes). Similar results were found for males in the current study. Furthermore, we found that the number of sleeping hours during night shift days was longer for males and shorter for females when compared with previous studies [11]. This was also true of number of nap hours. It is not concerned with the existence of acquisition for 120 minutes of naptime in the investigation [12] for night force's female for 16 hours, but there is no difference in a feeling of fatigue, and after the night shift was changing with the level with a high feeling of fatigue. Since the females of this study also showed fewer hours of naptime than did males, it was expected that they would continue to experience fatigue.

When the number of steps was compared, there were no gender differences. On days preceding a night shift, the number of steps were greater for females than for males. This might be because, since females had less sleeping hours on a night shift than did males, they were working for longer.

Females compared to males, spent 202 minutes more in general housekeeping, 51 minutes in life activities, and 6 minutes in resting. Indeed, even before their night shifts, females engaged more in housekeeping, which was found in previous studies [4] [5]. They also reported feeling that they would compensate for their short sleeping hours during their rest time.

On days-off, the sleeping hours of males in this study were longer by 5 hours than their contemporaries in the general population; this difference was not found among females. On the first day off, males spent 6 hours on the internet or watching TV [10]. Among males, since the work of the day off was also long, it was assumed that there were several opportunities to carry out internet research, etc.

Due to long service hours, nurses easily lose sleep. Moreover, due to the nature of the long hours of service and gender differences in shift work, the likelihood of experiencing intense fatigue is exceedingly high among this population, especially when sleeping hours are short [13]. We investigated changes in the degree of fatigue consciously experienced by medical-surgical female nurses during night shifts, and found the rate of drowsiness and the extent of eyestrain were quite high [14]. Thus, for a person working in shifts, recovery from fatigue after a night shift is an important problem, and it seems to be strongly associated with sleeping hours. Among males, we found that the time spent on sleep overall was around 600 minutes or more, which was much higher than the time spent on the internet, watching TV, or general housekeeping. Furthermore, sleep was generally secured before night shift days. On the first day off after a night shift, males showed greater time spent on the internet and other activities, such as general housekeeping, as well as work relations. On the second day off, work hours increased rapidly, followed by sleeping hours, leisure time, etc. Thus, even on two consecutive days off, males engaged in work. On the night shift day, females spent about 8 hours (490 minutes) sleeping, over 3 hours on general housekeeping, and around 1.5 hours on the internet.

We could not determine a clear difference between male and female nurses in recovery experience, although females showed relatively higher scores on mastery and control. When mastery and control over leisure time are strong, work time is unlikely to intrude into life activities. This might explain why the work-related time was higher among male nurses over the two consecutive days off compared to among female nurses. Furthermore, it seems rare for females to bring work back home compared with males. In order to promote recovery experience, work engagement needs to be managed [15] [16].

Since female nurses spent more time engaged in housekeeping than did male nurses, they could be considered to better at separating housekeeping, leisure time, and work time. Among male nurses, mastery was positively related to sleeping hours on the second day off. Workaholism is related to excess working time (overtime and percentage of overtime), poor quality of social relations (negative reactions of others), health problems (distress and psychosomatic complaints), high job demands, and various positive work outcomes

(organizational commitment) [17]. For workaholic workers, not working can produce feelings of guilt because of a strong feeling of duty to complete their work, which in turn might lead to a lower sense of fulfillment with the work [16]. Since male nurses brought work back over two consecutive days off, they generally showed greater work-related time. These nurses might be at risk of workaholism.

This study had several limitations. First, the limited sample size is associated with known risks of bias. Second, we were not able to measure fatigue or how it relates to life activities. In conclusion, the findings of the study highlight the importance of interventions designed for health management, considering sex differences among shift work nurses. Special attention towards life activity before the night shift is warranted. Recovery experience had different relations with various life activities between the genders.

ACKNOWLEDGMENTS

Table 1 Participant demographics

| Category | Male(n=7) | Female(n=19) | P-value |
|--|--------------|--------------|---------|
| Age(SD)(years) ^a | 38.1 (11.2) | 37.9 (7.8) | 0.967 |
| Clinical experience years as nurse(years) ^a | 15.7 (13.5) | 13.5 (7.4) | 0.705 |
| Commuting time(SD)(min) ^a | 37.1 (27.6) | 24.8 (17.3) | 0.185 |
| Nap time(SD)(min) ^a | 111.4 (48.1) | 83.6 (63.0) | 0.252 |
| Having child ^b | 4 (29%) | 10 (71%) | 0.550 |
| No having child ^b | 3 (25%) | 9 (75%) | |

a: unpaired t test

b:chi-square test

[5] M. Tournai, S. Tournai, "Time study of nurses' shift work and the influence of domestic labor on fatigue after ordinary labor," *Jpn. J. Public Health*, vol. 10, pp. 874–883, 2004. (in Japanese)

[6] T. Batak, L. Gvozdenovic, D. Bokan, D. Bokan, "The impact of nurses' shift work on the fatigue level." *Eastern Eur. Health Sci. J.*, vol. 3, no. 2, pp. 120–127, 2013.

[7] S. Sonnentag, C. Fritz, "The recovery experience questionnaire development and validation of a measure for assessing recuperation and unwinding from work." *J. Occup. Health Psychol.*, vol. 12, pp. 204–221, 2007.

[9] A. Shimazu, S. Sonnentag, K. Kubota, N. Kawakami, "Validation of the Japanese Version of the Recovery Experience Questionnaire." *J. Occup. Health*, vol. 54, pp. 196–205, 2012.

[10] [4] pp. 189–228.

[11] S. Oriyama, Y. Miyakoshi, T. Kobayashi, "Ways of taking rest and break during night shifts for two-shift nurses and factors supporting work – A comparison of 12- and 16-hour night shifts." *Jpn. Soc. Healthcare Admin.*, vol. 21, pp. 21–31, 2014 (in Japanese)

[12] S. Matumoto, T. Sasaki, M. Sakita, "The effects of the naps taken by hospital nurses in 16-hour nightshifts on their subjective fatigue feelings and subsequent sleep." *J. Sci. Labour*, vol. 84, no. 1, pp. 25-29, 2008 (in Japanese)

[13][3], pp. 134–135.

[14] K. Minematsu, T. Yamaguchi, M. Nakashima, N. Tsunawake, N. Ooshige, "Health Management for Medical-Surgical Female Nurses Having Night Shift Working." *Int. J. Nurs. Clin. Pract.*, vol. 4, pp. 1–5, 2017.

[15] W. B. Schaufeli, M. Salanova, V. Gonzalez-Roma, A. B. Bakker, "The measurement of engagement and burnout: a confirmatory factor analytic

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Conflicts of Interest

The authors have no potential conflicts of interest that are relevant to this article.

Authors' Contributions

Narumi Ooshige, Tae Yamaguchi, Mitsuyo Nakashima, Takuro Tobina, Kazuo Minematsu, and Noriaki Tsunawaki were responsible for the study conception and design and for critical revisions to the paper for important intellectual content. Narumi Ooshige and Tae Yamaguchi performed the data collection. Narumi Ooshige, Mitsuyo Nakashima, Takuro Tobina, Kazuo Minematsu, and Noriaki Tsunawake were responsible for the drafting of the manuscript and for statistical analysis of the data. Narumi Ooshige obtained funding and supervised the study.

REFERENCES

- [1] K. Spiegelhalter, W. Regen, S. Nanovska, C. Baglioni, D. Riemann, "Comorbid sleep disorders in neuropsychiatric disorders across the life cycle," *Curr. Psychiatry Rep.*, vol. 15, pp. 364, 2013.
- [2] K. Kati, H. Mikko, S. Mikael, H. Christer, V. Jussi, K. Mika, P. Sampsa, "Job strain, sleep and alertness in shift working health care professionals –A field study," *Industr. Health*, vol. 51, pp. 406-416, 2013.
- [3] Miyazaki S, Yamada N, Ookawa M, "Suimin gaku II," *Kitaoojishobou* (Kyoto), vol. 86, pp. 134-135, 2011 (in Japanese)
- [4] NHK Broadcasting Culture Research Institute, *Japanese daily life time 2010-NHK Japanese daily life investigation*. Tokyo: NHK Publishing Co. Ltd, 2011, pp. 166.

Table 2 Comparison of sleeping hours

| Evaluation point | Category | Male(n=7) | Female(n=19) | P-value |
|--------------------|-------------------------|---------------|---------------|---------|
| before night shift | sleeping time | 1:00 | 0:23 | 0.408 |
| | rising time | 11:18 | 8:28 | 0.017 |
| | sleeping hours(SD)(min) | 623.9 (54.0) | 490.1 (101.4) | 0.003 |
| 1st day off | sleeping time | 1:38 | 0:31 | 0.317 |
| | rising time | 9:06 | 8:01 | 0.232 |
| | sleeping hours(SD)(min) | 468.3 (146.9) | 476.2 (107.7) | 0.881 |
| 2nd day off | sleeping time | 0:18 | 0:03 | 0.771 |
| | rising time | 8:16 | 8:09 | 0.916 |
| | sleeping hours(SD)(min) | 502.4 (166.1) | 517.3 (138.2) | 0.821 |

unpaired t test

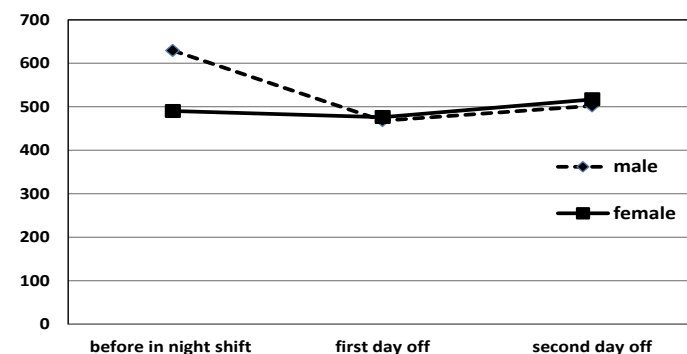


Figure 1: Transitions in the sleeping hours of males and females

approach." *J. Happiness Stud.*, vol. 3, pp. 71-92, 2002.

[16] K. Kubota, A. Shimazu, N. Kawakami, "Association of workaholism and work engagement with recovery experiences among Japanese workers." *J. Behav. Med.*, vol. 20, no. 2, pp. 69-76, 2014. (In Japanese)

[17] W. B. Schaufeli, T. W. Taris, W. Van Rhenen, "Workaholism, burnout and engagement: three of a kind or three different kinds of employee well-being." *Appl. Psychol. Int. Rev.*, 57, 173-203, 2008.

Table 3 Comparison of the number of steps

| Eveluation point | Male(n=7) | | Female(n=19) | | P-value |
|--------------------------------|-----------|--------|--------------|--------|---------|
| | Mean | SD | Mean | SD | |
| day shift (10:00—18:00) | 9388.0 | 2340.0 | 7930.3 | 2705.8 | 0.248 |
| before night shift(0:00-16:00) | 1205.5 | 92.6 | 3975.1 | 1976.0 | 0.070 |
| night shift(16:00-10:00) | 14449.4 | 1001.9 | 12984.6 | 3516.9 | 0.292 |
| after night shuft(10:00-24:00) | 6198.0 | 4779.8 | 3837.9 | 2316.1 | 0.135 |
| 1st day off(0:00-24:00) | 8120.5 | 5314.0 | 7032.6 | 3556.1 | 0.563 |
| 2nd day off(0:00-24:00) | 5662.8 | 3798.7 | 7649.4 | 5289.3 | 0.332 |

unpaired t test

Table 4 Comparison of life activity(min)

| Evaluation point | Classification | ①Sleep | | | ②Meals | | | ③Work | | | ④Housework | | | ⑤Conversation and relations | | | ⑥Leisure,sports and hobby | | | ⑦Internet, television, video | | | ⑧rest | | |
|------------------------------------|----------------|--------|-------|---------|--------|------|---------|-------|-------|---------|------------|-------|---------|-----------------------------|-------|---------|---------------------------|-------|---------|------------------------------|-------|---------|-------|-------|---------|
| | | Mean | SD | P-value | Mean | SD | P-value | Mean | SD | P-value | Mean | SD | P-value | Mean | SD | P-value | Mean | SD | P-value | Mean | SD | P-value | Mean | SD | P-value |
| before in night shift (0:00-16:00) | female(n=19) | 490.1 | 101.4 | 0.003 | 46.4 | 18.2 | 0.432 | 22.5 | 25.6 | 0.436 | 202.5 | 153.8 | 0.013 | 0.0 | 0.0 | 0.356 | 31.5 | 69.6 | 0.589 | 115.9 | 96.4 | 0.998 | 51.0 | 68.5 | 0.015 |
| | male(n=7) | 623.9 | 54.0 | | 39.9 | 19.5 | | 31.0 | 19.4 | | 78.6 | 77.8 | | 12.9 | 34.0 | | 51.4 | 111.9 | | 116.0 | 102.6 | | 6.4 | 17.0 | |
| 1st day off (0:00-24:00) | female(n=19) | 476.2 | 107.7 | 0.881 | 76.4 | 26.9 | 0.917 | 20.9 | 74.1 | 0.404 | 334.7 | 229.4 | 0.249 | 44.4 | 84.2 | 0.783 | 183.6 | 213.9 | 0.870 | 222.3 | 147.7 | 0.031 | 81.4 | 107.7 | 0.196 |
| | male(n=7) | 468.3 | 146.9 | | 75.0 | 35.5 | | 81.3 | 173.6 | | 222.9 | 158.2 | | 33.9 | 89.6 | | 168.7 | 167.9 | | 366.4 | 123.4 | | 23.6 | 62.4 | |
| 2nd day off (0:00-24:00) | female(n=19) | 517.3 | 138.2 | 0.821 | 86.3 | 28.0 | 0.442 | 7.5 | 22.0 | 0.107 | 353.0 | 248.0 | 0.111 | 48.9 | 113.2 | 0.969 | 125.9 | 149.6 | 0.409 | 196.2 | 173.1 | 0.931 | 104.8 | 145.0 | 0.214 |
| | male(n=7) | 502.4 | 166.1 | | 105.6 | 60.0 | | 202.6 | 272.3 | | 171.3 | 240.4 | | 47.1 | 48.6 | | 190.0 | 220.3 | | 188.9 | 229.2 | | 32.1 | 55.1 | |

unpaired t test

Table 5 Comparison of recovery experience

| | | Male(n=7) | | Female(n=19) | | P-value |
|---------------------|--------------------------|-----------|-----|--------------|-----|---------|
| | | Mean | SD | Mean | SD | |
| recovery experience | Psychological detachment | 3.4 | 0.5 | 3.6 | 0.9 | 0.592 |
| | Relaxation | 3.7 | 0.7 | 3.9 | 0.8 | 0.617 |
| | Mastery | 2.4 | 0.8 | 2.8 | 0.7 | 0.201 |
| | Control | 3.8 | 0.7 | 4.2 | 0.8 | 0.269 |

unpaired t test

Table 6 Sleeping hours, working hours and correlations of recovery experience

| | | | sleeping hours in 1st | working hours in 1st | sleeping hours in 2nd | working hours in 2nd |
|--------------|------------------------|--------------------------|-----------------------|----------------------|-----------------------|----------------------|
| | | | day off | day off | day off | day off |
| male(n=7) | recovery experience | Psychological detachment | .418 | -.159 | .145 | -.104 |
| | | Relaxation | -.487 | .490 | -.468 | .642 |
| | | Mastery | .127 | .045 | .891** | -.416 |
| | | Control | -.126 | -.157 | .396 | 0.000 |
| female(n=19) | recovery experience | Psychological detachment | -.170 | -.476* | .309 | -.285 |
| | | Relaxation | .060 | -.570* | .204 | -.149 |
| | | Mastery | -.206 | -.365 | .321 | -.282 |
| | | Control | -.043 | -.224 | .313 | -.090 |

Spearman Correlation coefficient

* P<0.05

** P<0.01