Supplementary Materials

Sleep-Scheduling Strategies in Hospital Shiftworkers

Harrison et al.

[Note: Supplementary Materials contain Tables S1-S3 and additional results]

Table S1. Relationships Between Shiftwork Adaptation Measures.

	Domestic Interference	Non-Domestic Interference	GI Symptoms	Fatigue	Adaptation	Advantages	Sleep Difficulty Day Work	Sleep Difficulty Night Work	Sleep Difficulty Days Off
Leisure Interference	0.59***	0.57***	0.21*	0.16^	-0.36***	-0.35***	-0.07	0.08	-0.01
Domestic Interference	--	0.53**	0.32**	0.27**	-0.22*	-0.44**	0.14	0.30**	0.22*
Non-Domestic Interference		--	0.26**	0.22*	-0.29**	-0.38***	0.18^	0.14	0.22*
GI Symptoms			--	0.32**	-0.23*	-0.10	0.35**	0.54***	0.23*
Fatigue				--	-0.32**	-0.26**	0.46***	0.40**	0.47***
Adaptation					--	0.40***	-0.09	-0.36**	-0.11
Advantages						--	0.02	-0.28**	-0.08
Sleep Difficulty Day Work							--	0.38**	0.61**
Sleep Difficulty Night Work								--	0.24*

Correlations (*r* values) between measures of adaptation; *** = p<0.001, ** = p<0.01, * = p<0.05, and ^ = p< 0.10.

Table S2. Adaptation and Frequency of Engaging in Sleep-scheduling Strategies.

Day Sleep-scheduling strategies				
	Not Well (1)	*Middle (2)*	*Very Well (3)*	*p value*
Switch Sleeper-D	0.80 (1.15)	1.09 (1.24)	0.82 (1.19)	0.61
Napper	1.60 (1.45)	1.60 (1.40)	2.24 (0.97)	0.23
Consistent	2.13 (1.36)	1.89 (1.21)	1.82 (1.33)	0.76
Incomplete Shifter-D	2.47 (1.06)	2.23 (1.12)	1.82 (1.01)	0.23
Night Sleep-scheduling strategies				
	Not Well (1)	*Middle (2)*	*Very Well (3)*	*p value*
Nap Proxy	1.81 (1.42)	1.33 (1.36)	0.92 (0.90)	0.20
Switch Sleeper-N	1.50 (1.51)	1.49 (1.20)	0.83 (1.03)	0.26
Incomplete Shifter-N	2.06 (1.18)	1.72 (1.30)	1.50 (1.31)	0.49
Night Stay	2.13 (1.45)	1.53 (1.28)	1.67 (1.44)	0.29
No Sleep	1.88 (1.45)	1.77 (1.34)	1.25 (1.48)	0.45
Switch Napper	1.25 (1.34)	1.84 (1.45)	2.08 (1.44)	0.25

Frequency of engaging in sleep-scheduling strategies (0-4; mean±SD) by adaptation scores (0-10), binned into three categories (1="not well" (<4), 2="middle" (4-6), and 3="very well" (≥7)), as in Petrov et al., 2014; (n=77 for day shifts and 71 for night shifts). Incomplete Shifter and Switch Sleeper appear as shift sleep-scheduling strategies for both day and night shifts, represented as "-D" and "-N", respectively.

Table S3. Strategies, Rationales and Individual Characteristics.

	Age (y)	rMEQ	Length of Commute to work (min)	Length of Commute from work (min)	Percent working nights	Percent schedule based on preference	Flexibility	Motivation to Improve Sleep	Sleep & Circadian Knowledge (% correct)
Day Strategies									
Consistent	-0.02	0.18	-0.15	-0.14	**-0.27***	-0.07	0.03	-0.15	-0.02
Switch Sleeper-D	0.01	-0.07	0.00	-0.02	0.17	0.00	-0.06	-0.04	-0.13
Incomplete Shifter-D	**-0.23^**	-0.07	0.05	-0.06	0.05	-0.16	0.17	-0.06	**-0.37****
Napper	0.02	-0.10	-0.02	0.02	0.08	0.05	0.17	0.25	-0.19
Day Rationales									
Leisure	0.08	0.22	0.06	-0.01	0.15	-0.17	-0.11	-0.21	0.16
Domestic	0.16	0.17	**0.29***	**0.28***	0.03	-0.06	-0.13	-0.06	0.06
Non-domestic	0.15	0.07	0.02	0.06	0.07	-0.02	-0.17	-0.03	-0.06
Commute	0.14		**0.46*****	**0.47*****	0.12	0.06	0.09	0.20	0.01
Night Strategies									
Incomplete Shifter-N	-0.13	0.21	-0.01	0.11	**-0.24***	**-0.33****	-0.17	0.09	0.06
No Sleep	-0.00	-0.02	0.02	0.07	-0.16	-0.01	0.00	**-0.33***	-0.23
Nap Proxy	-0.07	**-0.24***	-0.01	0.07	-0.14	0.15	0.20	0.17	-0.26
Night Stay	-0.06	-0.21	-0.22	-0.21	0.01	-0.10	0.01	0.01	0.07
Switch Sleeper-N	-0.15	0.00	-0.08	-0.02	-0.01	-0.18	0.10	0.02	0.09
Switch Napper	0.01	0.07	**0.38*****	**0.29***	0.05	-0.07	**0.30***	0.05	0.07
Night Rationales									
Leisure	-0.10	0.09	-0.04	-0.06	-0.11	**-0.28***	-0.04	-0.05	-0.03
Domestic	0.18	0.01	0.05	0.09	-0.02	-0.07	-0-03	-0.03	-0.07
Non-domestic	0.03	-0.04	-0.02	-0.03	-0.03	-0.11	-0.08	0.02	-0.20
Commute	-0.09	-0.04	**0.50*****	**0.48*****	-0.03	-0.01	0.09	-0.05	-0.02

rMEQ = Higher values equal greater morningness. ^ =0.05, *p<0.05, ** p<0.01, *** p<0.001. Morningness was associated with less sleep difficulty on day shifts and less general fatigue (r=-0.26, p<0.05 and r=-0.28, p<0.05, respectively). Age and rMEQ were not correlated in our sample (r=0.03, p=0.75), though age and length of time in shiftwork were related (r=0.58, p<0.001). Both age and time in shiftwork were related to the percent work schedule that was based on preference (r-0.26, p<0.05 and r=0.29, p<0.01, respectively). Time in shiftwork did not relate to any strategy or life domain (all p>0.13), and therefore is not included in the table. Age and time in shiftwork were also associated with higher sleep motivation scores (r=0.35, p<0.01 and r=0.29, p<0.05, respectively), as was the degree to which work schedule was based on preference (-r=0.36, p<0.01). Sample sizes are variable, as not all individuals worked all shifts and/or completed all items (n=75-77 for day shifts and 68-71 for night shifts). Additionally, only a subset of individuals (n=58) received the motivation and knowledge items.

Additional Results:

Strategies by Job Title: Hospital Corpsmen and Nurses

Participants included 34 Hospital Corpsmen (58.8% female) and 36 Active Duty (AD) nurses (72.2% female); the remaining 19 participants were civilian nurses and administrative staff. Per the navy.com website on careers, Corpsmen "assist health care professionals in providing medical care to Navy personnel and their families. They may function as clinical or specialty technicians, medical administrative personnel and healthcare providers at medical treatment facilities." As such, they tend to be more junior in their career than nurses. In our sample, Corpsmen were younger (mean±SD 26.4±10.0 vs 29.2±5.4 years; $p<0.001$) and less likely to have dependents ($p<0.01$) than AD nurses. There were no differences between the two groups in terms of gender or morningness (both $p>0.08$). For sleep-scheduling strategies on day shifts, Corpsmen were less likely than AD Nurses to employ the Switch Sleeper (Day) strategy ($X2[4]$ 15.14; $p>0.01$). All other strategies were not different between the two groups (all $p>0.24$). AD Nurses were more likely than Corpsmen to report that leisure time and commute played a part in the selection of their day-shift sleep strategies ($X2[4]$ 12.31; $p>0.05$ and $X2[4]$ 12.00; $p>0.05$, respectively; all other life domains, $p>0.20$). For night-shift strategies, there were no statistical differences between groups (all $p>0.10$). Corpsmen were also more likely than AD Nurses to indicate that non-domestic life played a part in selection of night-shift sleeping strategies ($X2[12]$ 11.25, $p<0.05$), and again, AD Nurses were more likely to indicate that commute played a part ($X2[4]$ 12.00; $p>0.05$; all other $p>0.21$).