

Supplementary Table S1. Weighted sample characteristics, stratified by retirement status and sex (N=22,485)

Characteristic	All (N= 22,485)	Males		Females	
		Completely Retired (n=5,484)	Not/Partly Retired (n=6,886)	Completely Retired (n=5,149)	Not/Partly Retired (n=4,966)
		%	%	%	%
Shift Work Status					
No shift work	82.8	79.9	82.2	85.1	83.8
Shift work	17.2	20.1	17.8	14.5	16.2
Missing	0.0	0.0	0.0	0.4	-
Age (years)					
Mean (SD)	60.0 (10.2)	69.0 (8.2)	54.5 (7.2)	68.4 (8.3)	54.0 (6.6)
45 -54 years	37.6	2.8	59.5	4.9	60.1
55 -64 years	31.4	30.1	31.3	30.6	33.3
65 - 74 years	19.2	38.5	7.5	38.0	5.5
75 – 85 years	11.8	28.5	1.7	26.5	1.1
Education					
Less than secondary	17.3	27.7	11.4	28.1	8.8
Secondary	11.5	11.7	10.1	14.3	11.0
Some post-secondary	8.9	9.2	8.7	9.8	8.3
Post-secondary	62.2	51.1	69.8	47.8	71.8
Missing	0.0	0.3	0.0	0.0	0.0

Acronyms: SD: Standard deviation.

Note: Multimorbidity is defined as ≥ 2 of the following conditions: anxiety or depression, cancer, cardiovascular disease, asthma, COPD, diabetes, arthritis, stroke.

Supplementary Table S1 (continued)

Characteristic	All (N= 22,485)	Males		Females	
		Completely	Not/Partly	Completely	Not/Partly
		Retired (n=5,484)	Retired (n=6,886)	Retired (n=5,149)	Retired (n=4,966)
	%	%	%	%	%
Household Income					
Less than \$20,000	4.3	6.8	1.8	9.1	1.9
\$20,000 - \$49,999	20.4	30.2	10.5	36.1	14.1
\$50,000 - \$99,999	32.3	38.5	29.6	30.3	32.9
\$100,000 - \$149,999	20.2	12.3	27.6	9.1	25.2
Greater than \$150,000	17.1	6.3	27.2	4.8	21.3
Missing	5.6	5.9	3.4	10.6	4.6
Marital Status					
Single, never married, or never lived with a partner	7.8	6.4	7.7	7.3	9.4
Married or common law	75.2	78.5	84.7	60.5	71.3
Widowed, divorced or separated	17.0	15.1	7.6	32.2	19.1
Missing	0.0	-	0.0	0.0	0.2
Migrant Status					
Non-Immigrant	81.3	80.3	80.8	81.9	82.3
Immigrant	11.9	14.4	11.2	12.3	10.5
Missing	6.8	5.3	8.0	5.8	7.2

Acronyms: SD: Standard deviation.

Note: Multimorbidity is defined as ≥ 2 of the following conditions: anxiety or depression, cancer, cardiovascular disease, asthma, COPD, diabetes, arthritis, stroke.

Supplementary Table S1 (continued)

Characteristic	All (N= 22,485)	Males		Females	
		Completely	Not/Partly	Completely	Not/Partly
		Retired (n=5,484)	Retired (n=6,886)	Retired (n=5,149)	Retired (n=4,966)
	%	%	%	%	%
Place of Residence					
Rural	5.1	4.8	4.7	4.7	6.2
Urban	90.4	90.6	90.5	90.9	89.9
Suburban	4.5	4.6	4.8	4.4	3.9
Socially Isolated					
No	79.2	56.9	91.0	60.9	94.6
Yes	20.7	42.8	9.0	38.8	5.4
Missing	0.1	0.3	0.0	0.3	0.0
Smoking Status					
Never smoker	30.0	21.6	30.7	32.1	33.6
Former smoker	58.9	68.5	58.7	57.3	53.1
Occasional or daily smoker	10.7	9.3	10.4	9.6	12.9
Missing	0.5	0.6	0.3	1.0	0.4
Past Week Physical Activity (PASE scale: 0 - 693)					
Mean (Standard Deviation)	152.0 (78.7)	125.2 (59.3)	182.5 (83.3)	110.1 (54.2)	163.1 (80.1)
Missing (n)	1,138	314	303	281	240

Acronyms: SD: Standard deviation.

Note: Multimorbidity is defined as ≥ 2 of the following conditions: anxiety or depression, cancer, cardiovascular disease, asthma, COPD, diabetes, arthritis, stroke.

Supplementary Table S1 (continued)

Characteristic	Males		Females		
	All	Completely	Not/Partly	Completely	Not/Partly
	(N= 22,485)	Retired	Retired	Retired	Retired
		(n=5,484)	(n=6,886)	(n=5,149)	(n=4,966)
	%	%	%	%	
Alcohol Consumption					
Never drinker	2.6	2.1	1.6	4.6	2.6
Former drinker	13.1	14.0	10.6	18.2	11.9
Infrequent drinker	11.8	9.3	8.7	17.0	14.0
Occasional drinker	25.7	22.4	26.3	23.9	28.8
Regular drinker	43.5	48.9	48.3	34.7	39.8
Binge drinker	3.3	3.3	4.5	1.6	2.8
Missing	0.0	0.0	0.0	0.0	0.1
Fruit and Vegetable Intake					
(Servings/ day)					
Seven or more	10.2	7.5	7.6	12.1	14.4
Six	9.5	6.6	7.3	12.5	12.1
Five	16.1	11.9	13.7	18.2	20.8
Four	16.2	13.6	14.9	18.4	18.4
Three	16.5	18.2	18.6	14.1	14.2
Two	14.8	18.5	18.4	11.2	10.1
Less than two	10.3	16.3	13.8	6.3	4.2
Missing	6.3	7.4	5.6	7.2	5.8

Acronyms: SD: Standard deviation.

Note: Multimorbidity is defined as ≥ 2 of the following conditions: anxiety or depression, cancer, cardiovascular disease, asthma, COPD, diabetes, arthritis, stroke.

Supplementary Table S1 (continued)

Characteristic	All (N= 22,485)	Males		Females	
		Completely	Not/Partly	Completely	Not/Partly
		Retired (n=5,484)	Retired (n=6,886)	Retired (n=5,149)	Retired (n=4,966)
	%	%	%	%	%
BMI (kg/m²)					
Underweight or normal weight	28.0	22.4	22.4	30.8	37.6
Overweight	39.6	43.4	45.4	36.8	30.8
Obese	31.1	32.4	30.9	31.4	30.3
Missing	1.3	1.8	1.3	1.0	1.3
Self-rated Health					
Excellent or Good Self-Rated Health	91.1	86.7	92.2	89.6	94.1
Fair or Poor Self-Rated Health	8.9	13.3	7.7	10.4	5.9
Missing	0.0	0.0	0.1	0.0	0.0
Multimorbidity					
0 -1 Chronic Disease	72.1	63.5	83.3	57.8	74.6
≥ 2 Chronic Diseases	27.9	36.5	16.7	42.2	25.4
Psychological Distress					
Low Distress	81.9	82.8	85.0	77.6	80.4
High Distress	12.1	10.0	10.3	15.2	13.7
Missing	6.0	7.2	4.7	7.2	5.9
Sleep Quality					
Good Sleep Quality	74.1	79.1	75.4	72.7	69.6
Poor Sleep Quality	25.8	20.8	24.5	27.2	30.4
Missing	0.0	0.2	0.0	0.1	0.0

Acronyms: SD: Standard deviation.

Note: Multimorbidity is defined as ≥ 2 of the following conditions: anxiety or depression, cancer, cardiovascular disease, asthma, COPD, diabetes, arthritis, stroke.

Supplementary Table S2. Weighted sample characteristics of shiftworkers by sex (N=3,632)

Characteristic	All	Males	Females
	(N= 3,632)	(n=2,131)	(n=1,501)
	%	%	%
Age (years)			
Mean (SD)	60.1 (10.0)	60.4 (10.0)	59.7 (10,2)
45 -54 years	35.2	34.8	35.8
55 -64 years	34.2	33.3	35.6
65 - 74 years	19.8	20.7	18.4
75 – 85 years	10.8	11.2	10.2
Education			
Less than secondary	24.0	24.7	23.2
Secondary	11.1	13.0	8.5
Some post-secondary	9.7	11.5	7.1
Post-secondary	55.1	50.9	61.1
Missing	0.0	0.0	0.0
Household Income			
Less than \$20,000	6.8	4.7	9.9
\$20,000 - \$49,999	24.1	20.6	29.1
\$50,000 - \$99,999	32.4	33.9	30.3
\$100,000 - \$149,999	17.6	19.5	14.9
Greater than \$150,000	14.2	17.0	10.2
Missing	4.8	4.3	5.5

Acronyms: SD: Standard deviation.

Note: Multimorbidity is defined as ≥ 2 of the following conditions: anxiety or depression, cancer, cardiovascular disease, asthma, COPD, diabetes, arthritis, stroke.

Supplementary Table S2 (continued)

Characteristic	All	Males	Females
	(N= 3,632)	(n=2,131)	(n=1,501)
	%	%	%
Marital Status			
Single, never married, or never lived with a partner	9.1	7.8	11.0
Married or common law	73.9	81.3	63.4
Widowed, divorced or separated	16.8	10.9	25.3
Missing	0.0	-	0.2
Migrant Status			
Non-Immigrant	79.2	79.9	78.2
Immigrant	11.9	12.0	11.8
Missing	8.9	8.1	10.0
Place of Residence			
Rural	6.6	7.0	6.0
Urban	88.9	87.9	90.3
Suburban	4.4	5.0	3.6
Socially Isolated			
No	79.4	78.6	80.5
Yes	20.3	21.0	19.3
Missing	0.3	0.4	0.2

Acronyms: SD: Standard deviation.

Note: Multimorbidity is defined as ≥ 2 of the following conditions: anxiety or depression, cancer, cardiovascular disease, asthma, COPD, diabetes, arthritis, stroke.

Supplementary Table S2 (continued)

Characteristic	All	Males	Females
	(N= 3,632)	(n=2,131)	(n=1,501)
	%	%	%
Smoking Status			
Never smoker	31.3	27.5	36.8
Former smoker	56.8	60.9	50.8
Occasional or daily smoker	11.4	11.3	11.7
Missing	0.4	0.3	0.7
Past Week Physical Activity (PASE scale: 0 - 693)			
Mean (Standard Deviation)	163.6 (85.6)	168.4 (85.9)	156.5 (84.7)
Missing (n)	218	121	97
Alcohol Consumption			
Never drinker	2.8	2.4	3.4
Former drinker	17.2	15.7	19.2
Infrequent drinker	12.7	9.8	16.7
Occasional drinker	25.8	25.4	26.3
Regular drinker	37.9	41.8	32.4
Binge drinker	3.6	4.7	1.9
Missing	0.0	0.0	0.1

Acronyms: SD: Standard deviation.

Note: Multimorbidity is defined as ≥ 2 of the following conditions: anxiety or depression, cancer, cardiovascular disease, asthma, COPD, diabetes, arthritis, stroke.

Supplementary Table S2 (continued)

Characteristic	All	Males	Females
	(N= 3,632)	(n=2,131)	(n=1,501)
	%	%	%
Fruit and Vegetable			
Intake (Servings/ day)			
Seven or more	10.1	8.0	13.2
Six	9.1	9.2	9.1
Five	14.9	11.0	20.6
Four	15.8	13.4	19.1
Three	14.0	15.6	11.8
Two	16.9	20.9	11.3
Less than two	11.6	14.9	6.7
Missing	7.5	7.1	8.2
BMI (kg/m²)			
Underweight or normal			
weight	24.3	18.4	32.7
Overweight	39.7	44.9	32.2
Obese	34.6	34.9	34.2
Missing	1.4	1.8	0.8
Self-rated Health			
Excellent or Good Self-			
Rated Health	88.8	87.3	91.0
Fair or Poor Self-Rated			
Health	11.1	12.6	9.0
Missing	0.0	0.0	0.0

Acronyms: SD: Standard deviation.

Note: Multimorbidity is defined as ≥ 2 of the following conditions: anxiety or depression, cancer, cardiovascular disease, asthma, COPD, diabetes, arthritis, stroke.

Supplementary Table S2 (continued)

Characteristic	All	Males	Females
	(N= 3,632)	(n=2,131)	(n=1,501)
	%	%	%
Multimorbidity			
0 -1 Chronic Disease	69.6	73.0	64.6
≥ 2 Chronic Diseases	30.4	27.0	35.4
Psychological Distress			
Low Distress	81.4	82.9	79.1
High Distress	11.9	10.6	13.9
Missing	6.7	6.5	7.0
Sleep Quality			
Good Sleep Quality	73.0	74.3	71.1
Poor Sleep Quality	27.0	25.6	28.9
Missing	0.0	0.0	0.0

Acronyms: SD: Standard deviation.

Note: Multimorbidity is defined as ≥ 2 of the following conditions: anxiety or depression, cancer, cardiovascular disease, asthma, COPD, diabetes, arthritis, stroke.

Supplementary Table S3. Weighted descriptive analysis of cognition scores among shiftworkers by sex (N=3,312).

	All	Males	Females
Cognition scores	(N= 3,312)	(n=1,932)	(n=1,380)
	n	n	n
Immediate Recall (0 – 14 points)			
Mean (SD)	5.6 (1.8)	5.3 (1.71)	6.1 (1.9)
Delayed Recall (0 – 14 points)			
Mean (SD)	3.9 (2.0)	3.5 (1.9)	4.4 (2.1)
MAT Score (0 – 51 points)			
Mean (SD)	25.7 (9.0)	26.4 (9.0)	24.7 (8.9)
Interference Condition (1-132 seconds)			
Mean (SD)	16.7 (5.0)	16.8 (4.9)	16.5 (5.0)

Acronyms: SD: Standard deviation.

Supplementary Table S4. Interaction effect between psychological distress and shift work

	B	95% CI
Immediate Recall Trial		
Shift Work x High Distress	0.22	-0.05, 0.48
Delayed Recall Trial		
Shift Work x High Distress	0.09	-0.19, 0.37
MAT		
Shift Work x High Distress	-0.36	-1.57, 0.85
Interference Condition		
Shift Work x High Distress	0.60	-0.08, 1.28

Abbreviations: CI: confidence interval;
Significant results are bolded.