

The influence of rotated work-shifts on the development of psychological distress: a longitudinal study

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Research Team

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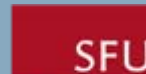
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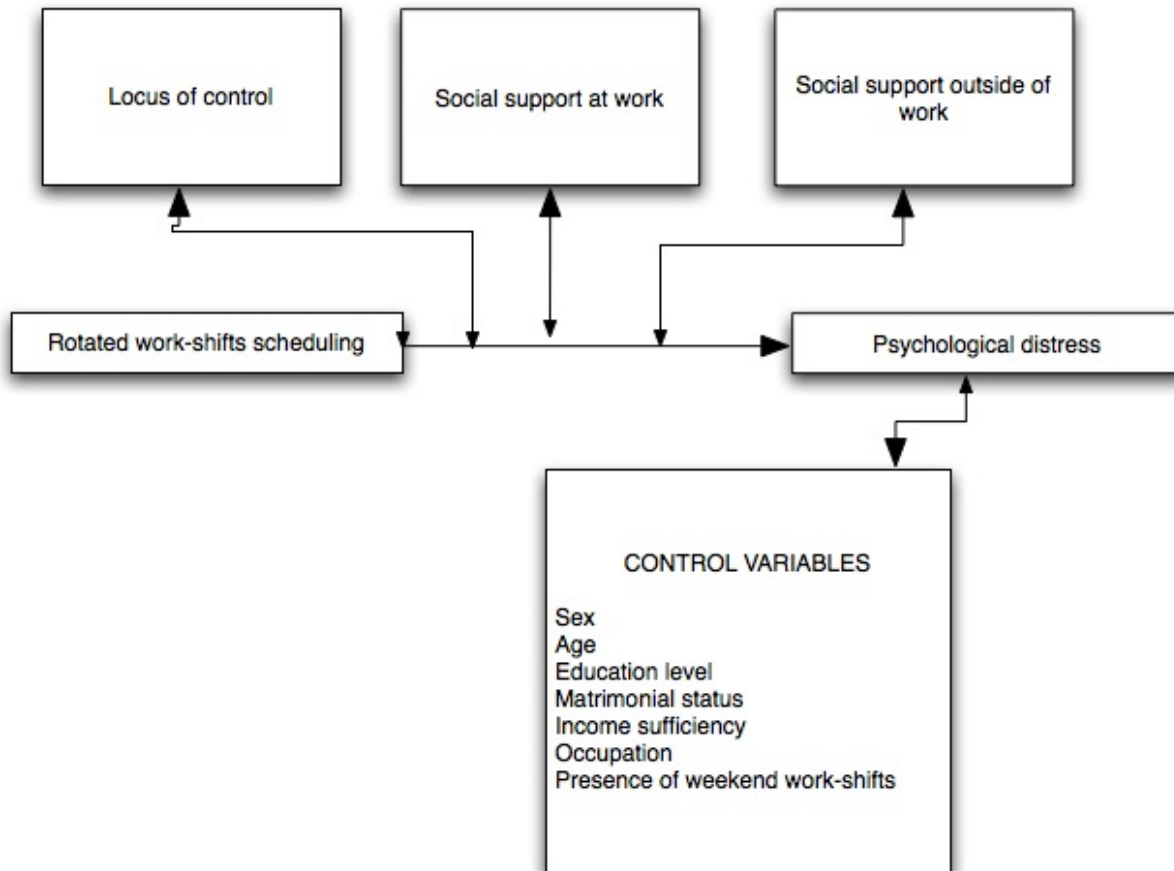
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Research questions

- Are workers experiencing rotated work-shifts more likely to have psychological distress than workers with regular day evening or night-shifts?
- Are social support at work or social support outside of work and locus of control in workers influencing the relationship between rotated work-shifts and psychological distress?

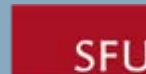


Conceptual model



Independent variables

- *Rotated work-shifts*
Combination of two, three or more work-shifts during daytime, evening or at night changing at regular intervals (Barton, 1994; Dion,1986).
- *Standard daytime shift*
Usually between 6h00 and 19h00 from Monday to Friday, thus including the typical “9 to 5” schedule. (Beers, 2000; Dion,1986; Shields, 2002).
- *Standard evening shift*
Starts after 15h00 et ends usually about midnight (Dion,1986; Presser, 1999; Shields, 2002).
- *Standard night shift*
Usually between 23h00 and 11h00 (Shields, 2002). Dion (1986) mentions that it is more often between 24h00 and 8h00.



Dependent variable

- *Psychological distress*

Refers to the presence of negative symptoms of affective, cognitive and behavioral type..

The components of psychological distress include:

- Self-depreciation;
- Irritability and aggressiveness
- Anxiety/depression
- Social isolation

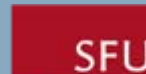
The most common manifestations are anxiolytic and depressive reactions following fatigue, lack of energy and self isolation.

SOURCE: Massé, Poulin, Dassa, Lambert, Bélair et Battaglini (1998)



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Moderating variables

- *Locus of control (feeling of control)*
Represents what people generally believe about the influence they have on their life. The locus of control may be internal or external (Rotter, 1966).
- *Social support at work*
The level of support provided by colleagues or supervisors (Karasek, 1985).
- *Social support outside of work*
The level of support provided by significant persons in the familial and social environment of the individual (Bourbonnais, Brisson, Vézina et Moisan, 1996; Fuhrer, Stansfeld, Chemeli et Shipley, 2002).



Research hypotheses

- **Hypothesis 1**

Workers with rotated work-shifts will have a higher level of psychological distress than those with daytime, evening or night shifts.

- hypothesis 1a

Changing from rotated work-shifts to a daytime, evening or night shift will reduce the level of psychological distress experienced by workers.

- hypothesis 1b

Changing from a daytime, evening or night shift to rotated work-shifts will increase the level of psychological distress experienced by workers.

- hypothesis 1c

A continuous or long term exposure to rotated work-shifts will increase or at least maintain the level of psychological distress experienced by workers.



Research hypotheses

- **Hypothesis 2**

The effects of rotated work-shifts on psychological distress will be smaller in workers with an internal locus of control as compared to those with an external locus of control..

- **Hypothesis 3**

The higher the social support at work, the lower the influence of rotated work-shifts on psychological distress.

Hypothesis 4

The higher the social support outside of work, the lower the influence of rotated work-shifts on psychological distress.

Methods

- Measurements

Variables	Scale	Source
Psychological distress	6 items	Kessler and Mroczek (1994)
Locus of control	7 items	Pearlin and Schooler (1978)
Social support at work	2 items	Karasek (1985)
Social support outside of work	19 items	Shelbourne and Stewart (1991)



Methods

- DATABASE
 - National Population Health Survey (2000 and 2002)
 - Longitudinal design
 - Questionnaire developed by Statistics Canada
 - Questionnaire administered on the phone by an interviewer



Methods

- Sampling criteria for study
 - Only one full time job
 - Aged from 15 to 64
 - Work on a daytime, evening, night or rotated work-shift
- *Restrictive sample* : 4 090 participants in 2000 and 4 091 participants in 2002
- *Combined sample* : 3 445 participants in 2000 and 2002.



Results

- Descriptive statistics

Means and standard deviations (except for work schedules and control variables).

Work schedule

WORK-SHIFT	VALID FREQUENCY(%)			
	TARGET SAMPLE		RESTRICTIVE SAMPLE	
	2000	2002	2000	2002
Daytime	84,3	83,0	85,5	85,6
Evening	3,0	3,5	2,7	2,9
Night	2,2	2,2	2,2	2,0
Rotated	10,5	11,3	9,6	9,5



Results

Moderating variables

Descriptive statistics for moderating variables

VARIABLE	RANGE	2000		2002	
	(min to max)	Mean	SD	Mean	SD
Locus of control	0 to 28	20,30	3,51	20,04	3,63
Social support outside of work	0 to 76	66,21	12,08	65,39	12,42
Social support from colleagues	0 to 4	2,37	0,92	2,35	0,95
Social support from supervisors	0 to 4	2,08	0,70	2,08	0,71



Results

Internal consistency analysis (Cronbach alpha)

VARIABLE	2000	2002
PSYCHOLOGICAL DISTRESS	0.79	0.77
LOCUS OF CONTROL	0.74	0.76
SOCIAL SUPPORT OUTSIDE WORK	0.97	0.96
SOCIAL SUPPORT AT WORK	0.42	0.46



Results

REGRESSION ANALYSIS § moderating effect of locus of control on the relationship between rotated work-shifts and psychological distress (2000)

Regression model	<i>B</i>	<i>SE</i>	§ (<i>adjusted</i>)	<i>R</i> ²
STEP 1				0.025
Sex	0.606	0.006	-0.129**	
Age	-0.035	0.120	0.090**	
Matrimonial status	-0.055	0.133	-0.045	
Education	0.040	0.223	0.043	
Family income	0.096	0.872	-0.138	
Occupation	-0.212	0.181	-0.225	
Weekend shifts	0.181	0.144	0.296	
STEP 2				0.160
Evening shift	4,434	3.332	0.270	
Night shift	5,518	3.558	0.190	
Rotated work-shifts	-1,165	1.600	-0.023	
Locus of control	-0.279	0.024	-0.357*	
STEP 3				0.147
L. C ^a x Evening shift	-0.173	0.161	-0.233	
L. C x Night shift	-0.286	0.169	-0.191	
L. C x Rotated work-shifts	0.059	0.074	0.016	

* $p < 0.05$. ** $p < 0.01$. N = 3 013

Note^a L.C : locus of control



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Results

REGRESSION ANALYSIS § moderating effect of locus of control on the relationship between rotated work-shifts and psychological distress (2002)

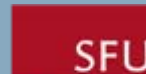
Regression model	<i>B</i>	<i>SE</i>	§ (<i>adjusted</i>)	<i>R</i> ²
STEP 1				0.026
Sex	0.688	0.121	0.011	
Age	-0.028	0.007	-0.117**	
Matrimonial status	-0.153	0.148	-0.059	
Education	0.037	0.024	0.052	
Family income	0.224	0.080	0.043	
Occupation	-0.098	0.188	-0.011	
Weekend shifts	0.092	0.166	0.004	
STEP 2				0.143
Evening shift	3.732	3.49	0.146	
Night shift	5.350	3.18	0.262	
Rotated work-shifts	0.627	1.50	0.245	
Locus of control	-0.256	1.50	-0.340*	
STEP 3				0.166
L. C ^a x Evening shift	-0.154	0.168	-0.128	
L. C x Night shift	-0.209	0.156	-0.211	
L. C x Rotated work-shifts	-0.009	0.071	0.220	

* $p < 0.05$. ** $p < 0.01$. $N = 3\ 010$



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Conclusions

- Hypothesis 1

- **Partially infirmed**

Workers with rotated work-shifts do not experience a higher level of psychological distress than the others.

However results show that the night shift is associated with a higher level of psychological distress than with rotated work-shifts, in 2000 only.



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Conclusions

- Hypothesis 2 - not confirmed
The locus of control does not have any moderating effect on the relationship between rotated work-shifts and psychological distress in workers.
However, results show that a high level of the internal locus of control is associated with a lower level of psychological distress.



Results

REGRESSION ANALYSIS § moderating effect of social support outside of work on the relationship between rotated work-shifts and psychological distress (2000)

Regression model	<i>B</i>	<i>SE</i>	§ (<i>adjusted</i>)	<i>R</i> ²
STEP 1				0.025
Sex	0.707	0.129	0.111**	
Age	-0.028	0.006	-0.109**	
Matrimonial status	0.258	0.147	0.015	
Education	-0.002	0.023	-0.006	
Family income	-0.040	0.085	-0.051	
Occupation	-0.055	0.196	0.003	
Weekend shifts	0.141	0.143	0.031	
STEP 2				0.096
Evening shift	1.234	2.126	0.223	
Night shift	1.004	3.995	-0.025	
Rotated work-shifts	-1.127	1.701	0.043	
Social support outside of work	-0.0594	0.063	-0.257*	
STEP 3				0.102
SSOW x Evening shift	-0.002	0.057	-0.191	
SSOW x Night shift	-0.015	0.244	0.032	
SSOW x Rotated work-shifts	0.017	0.459	-0.051	

* $p < 0.05$. ** $p < 0.01$. $N = 2\ 973$



Results

REGRESSION ANALYSIS § moderating effect of social support outside of work on the relationship between rotated work-shifts and psychological distress (2002)

Regression model	<i>B</i>	<i>SE</i>	§ (<i>adjusted</i>)	<i>R</i> ²
STEP 1				0.026
Sex	0.816	0.007	0.129**	
Age	-0.023	0.132	-0.110**	
Matrimonial status	0.238	0.163	0.153	
Education	0.022	0.023	0.159	
Family income	0.067	0.088	-0.001	
Occupation	-0.001	0.184	0.001	
Weekend shifts	-0.085	0.146	-0.003	
STEP 2				0.108
Evening shift	0.948	2.552	0.085	
Night shift	5.430	3.542	0.259	
Rotated work-shifts	2.579	1.422	0.140	
Social support outside of work	-0.059	0.008	-0.522*	
STEP 3				0.110
SSOW x Evening shift	-0.003	0.038	0.546	
SSOW x Night shift	-0.057	0.051	0.163	
SSOW x Rotated work-shifts	-0.030	0.021	0.308	

* $p < 0.05$. ** $p < 0.01$. N = 2 969



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Conclusions

- Hypothesis 3 - not confirmed

Social support outside of work does not have a moderating effect on the relationship between rotated work-shifts and the level of psychological distress.

However, a high level of social support outside of work from family and friends does have a significant direct effect on psychological distress.



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Results

REGRESSION ANALYSIS § moderating effect of social support at work from colleagues on the relationship between rotated work-shifts and psychological distress (2000)

Regression model	<i>B</i>	<i>SE</i>	§ (<i>adjusted</i>)	<i>R</i> ²
STEP 1				0.025
Sex	0.668	0.006	-0.097**	
Age	-0.020	0.123	-0.080*	
Matrimonial status	-0.088	0.141	-0.045	
Education	-0.001	0.023	0.004	
Family income	-0.045	0.084	-0.053	
Occupation	-0.095	0.192	-0.002	
Weekend shifts	0.153	0.151	0.033	
STEP 2				0.033
Evening shift	1,915	1,151	0.118	
Night shift	-0.386	1,333	0.006	
Rotated work-shifts	-0.056	0.784	-0.111	
Social support from colleagues	0.155	0.094	0.064	
STEP 3				0.033
SSWC x Evening shift	-0.329	0.771	-0.074	
SSWC x Night shift	0.145	0.563	0.002	
SSWC x Rotated work-shifts	0.072	0.379	0.085	

* $p < 0.05$. ** $p < 0.01$. $N = 2\,991$



Results

REGRESSION ANALYSIS § moderating effect of social support at work from colleagues on the relationship between rotated work-shifts and psychological distress (2002)

Regression model	<i>B</i>	<i>Erreur-type</i>	§ (<i>ajust</i>)	<i>R</i> ²
STEP 1				0.026
Sex	0.748	0.007	0.114**	
Age	-0.145	0.134	-0.079*	
Matrimonial status	-0.162	0.154	-0.060	
Education	0.018	0.025	0.025	
Family income	0.089	0.091	-0.001	
Occupation	0.199	0.204	1,500	
Weekend shifts	0.125	0.168	0.011	
STEP 2				0.050
Evening shift	3,349	1,1451	0.098	
Night shift	2,981	2,998	0.075	
Rotated work-shifts	0.347	0.981	-0.020	
Social support from colleagues	0.559	0.194	0.120**	
STEP 3				0.052
SSWC x Evening shift	-1,158	0.577	-0.079*	
SSWC x Night shift	-0.623	1,439	-0.002	
SSWC x Rotated work-shifts	0.019	0.440	0.037	

* $p < 0.05$. ** $p < 0.01$. $N = 2\,977$



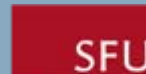
Conclusions

- Hypothesis 4 - not confirmed

Social support at work does not have a moderating effect on the relationship between rotated works-shifts and the level of psychological distress in workers.

However, results show that social support from colleagues does have a moderating effect on the relationship between evening shifts and psychological distress.

Results also show that social support at work in general does have a direct effect on psychological distress. A higher level of social support being associated with a lower level of psychological distress..



Results

REGRESSION ANALYSIS § moderating effect social support at work from supervisors on the relationship between rotated work-shifts and psychological distress (2000)

Regression model	<i>B</i>	<i>SE</i>	§ (<i>adjusted</i>)	<i>R</i> ²
STEP 1				0.025
Sex	0.678	0.006	0.097*	
Age	-0.021	0.134	-0.080**	
Matrimonial status	-0.082	0.140	-0.044	
Education	-0.001	0.023	0.005	
Family income	-0.039	0.084	-0.057	
Occupation	-0.081	0.188	-0.001	
Weekend shifts	0.129	0.149	0.027	
STEP 2				0.038
Evening shift	3,126	1,059	0.093*	
Night shift	0.804	1,037	0.051	
Rotated work-shifts	0.344	0.064	-0.005	
Social support from supervisors	0.277	0.083	-0.002**	
STEP 3				0.041
SSWS x Evening shift	-0.819	0.342	0.134*	
SSWS x Night shift	-0.331	0.340	-0.002	
SSWS x Rotated work-shifts	-0.109	0.239	0.082	

* $p < 0.05$. ** $p < 0.01$. N = 2 988



Results

REGRESSION ANALYSIS § moderating effect of social support at work from supervisors on the relationship between rotated work-shifts and psychological distress (2002)

Regression model	<i>B</i>	<i>SE</i>	§ (<i>adjusted</i>)	<i>R</i> ²
STEP 1				0.026
Sex	0.760	0.007	0.120**	
Age	-0.015	0.134	-0.080*	
Matrimonial status	-0.174	0.153	-0.060	
Education	0.010	0.026	0.020	
Family income	0.074	0.094	-0.009	
Occupation	0.108	0.207	0.003	
Weekend shifts	0.109	0.169	0.007	
STEP 2				0.037
Evening shift	2,369	1,469	0.069	
Night shift	0.626	1,956	0.014	
Rotated work-shifts	-0.045	0.765	-0.075	
Social support from supervisors	0.187	0.093	0.076*	
STEP 3				0.040
SSWS x Evening shift	-0.637	0.479	-0.050	
SSWS x Night shift	0.386	0.679	0.059	
SSWS x Rotated work-shifts	0.181	0.306	0.099	

* $p < 0.05$. ** $p < 0.01$. $N = 2\,968$



Contributions

- Major role of locus of control on psychological distress.
- Lack of validity in measurement scale of social support at work stemming from the Karasek studies (1985; 1989).
- A cumulative exposure to rotated work-shifts is associated with a higher level of psychological distress in workers.
- The inclusion of weekend shifts (within rotated work-shifts scheduling) does not increase the level of psychological distress in workers.

