Longitudinal, experimental evaluation of reduced weekly working hours for assistant nurses

Bengt Lorentzon[1]

M.Sc. Pacta Guideline Research, Sweden. Med Dr. Fei Yang, Department of Clinical Neuroscience, Karolinska Institute, Stockholm, Sweden.

Peer reviewed: Professor Göran Kecklund, the director of Stress Research Institute, Stockholm University, Sweden.

Abstract

The purpose of this study was to determine if it's sufficient to reduce working hours (RWH) in order to improve health and working conditions for assistant nurses (AN), and to explore if additional interventions were required. This 23-month longitudinal, interventional, parallel group study investigated the impact of RWH among AN at elderly care facilities in Gothenburg, Sweden. Study participants worked 6-hour per day with full pay. New personnel were hired to compensate for the RWH. The finding of this study showed the consistent improved health directly relating to RWH. However, the main finding was unexpectedly something different – a finding that was quite unmentioned in previous studies. As an isolated intervention, RWH was insufficient on its own to reduce the ill effects on health from lifestyle and working conditions. RWH creating the space needed to implement additional interventions.

Key terms

Assistant nurses / elderly care facilities / health determinants / perceived health / public health / reduced working hours / sickness absence / working environment

[1] Corresponding author: Bengt Lorentzon, Pacta Guideline Research, Gothenburg, Sweden. bengt.lorentzon.research@pactaguideline.se

Aim and research question

This longitudinal, experimental evaluation of reduced weekly working hours for assistant nurses investigated the impact of RWH on the health and working conditions of AN in residential elderly care facilities. The analyses conducted in the current study were based solely on anonymous, aggregate data. The model for these analyses took into account whether effect sizes were due to RWH, or were random, or depended on other factors.

Previous research demonstrate that RWH improve the health with impact for employees and working life. In addition the purpose of this study was to find out what was unimproved.

This study is explicit about AN. Few studies have that focus despite AN comprise the single largest occupational group in Sweden. The study was designed to isolate the impact of RWH. Finally, a discussion was held on how the results could be applied and how changes could be implemented for a sustainable health and working life for nurses.

Background

Public health and the work environment

Public health

While the trajectory of public health generally continues to be positive, there are growing differences between population groups. For example, the least educated people are the least healthy (Mackenbach et al., 2008). National public health surveys indicate differences between population groups regarding level of physical activity during leisure time. Sedentary leisure with less physical activity and less exercise involving all muscle groups is more common among people from a vulnerable economic background (paycheck to paycheck) with less education and lower income, as well as among manual laborers, low-level administrators and people born outside Europe (Public Health Agency of Sweden, 2016). These differences among population groups also apply to dietary choices and eating habits (Public Health Agency of Sweden et al., 2011). People who fail to get adequate physical activity are at 'approximately twice the risk of mortality and of developing cardiovascular disease compared with people who exercise for health purposes at least 30 – 60 minutes/day' (Elinder Schäfer et al., 2006).

Cardiorespiratory fitness (VO_2max) showed a general decline in Sweden between 1995 and 2017 according to a study of a Swedish work force involving 354 277 participants, age 18-74, from various occupations. A low level of education was one of four risk indicators of reduced VO_2max (Ekblom-Bak et al., 2018). A Swedish study involving 5 720 healthy men and women showed that high work demands and physically demanding jobs are determinants for disturbed

sleep. Risk indicators include age >45, female gender, high body mass index (BMI) and inadequate amount of physical exercise (Åkerstedt et al., 2002).

Work environment

According to the Swedish Work Environment Authority, the main risks encountered by people who work in nursing and social services include stress, work overload, adverse organizational and social conditions, risk of infection, potential threats and violence, as well as gender stereotypes and patterns. Such stereotypes may pertain to values, traditions and relationships (Sverke et al., 2016). Women who work in elderly care facilities have the highest rate of sickness absence in Sweden (National Insurance Authority, 2016). This may indicate a gender-related determinant within the work organization (Vänje, 2015). Work within elderly care is characterized by little control or latitude to act, problems related to high pressure, almost constant stress, heavy workload, staffing issues and resources that fall short of expectations. This scenario stands in sharp contrast to working in the field of technology (Arbetsmiljöverket, 2014) (Jonsson et al., 2015) .

One study showed that 50% of nursing personnel have considered quitting their jobs. Ten years ago, the corresponding figure was 40% (Szebehely et al., 2017). In the fields of health care and social services, 10% of employees believe their personal health will pose an obstacle to work within two years, compared with 8% among the workforce at large (Munck af Rosenschöld, 2016). In a forecast extending to 2 035, employers believe there is risk of a nursing shortage due to retirement, while demand for social and medical services is expected to increase (Grünewald-Zetterberg et al., 2014).

In Sweden, AN comprise the single largest occupational group, 138 200 (Stymne et al., 2018), which entails substantial personnel resources with a need for improved working conditions. Of AN, 92% are women (Stymne et al., 2018), a weak occupational group (Sverke et al., 2016) that works with a vulnerable population (Tullman DF, Chang BL, 1999), both of which pose obstacles to meaningful change (van Stenis et al., 2017).

Previous research, RWH

Non-health care

One large-scale study commissioned by the government (Bildt et al., 2007), involving 410 participants in different occupational groups, found that RWH had no clear benefit on physical health, although perception of health and sleep quality did improve. Another study found that reducing the work week to 30 hours while retaining the same salary provides strong

psychosocial benefits, resulting in more sleep and less stress, anxiety and fatigue (Kecklund et al., 2010). Yet another study shows that shortening working hours has clear social benefits and a positive impact on wellbeing (Akerstedt et al., 2001). Trials involving a RWH have suggested a beneficial effect on work–family interaction (Anttila et al., 2005). And a different study shows that a 25% RWH among full-time employees resulted in more time spent in recovery activities (Schiller et al., 2018). Another study suggests 'that interventions involving a modest RWH seem to be more effective if these hours are used for physical exercise' (Von Thiele Schwarz, et al., 2008).

One study shows that a 25% RWH among full-time employees resulted in increased quality of sleep and sleep duration, decreased fatigue, and less stress and anxiety at bedtime. These results were independent of gender, age, and children living at home (Schiller et al., 2017). According to American Thoracic Society recommendations, sleep should not be less than six hours or more than nine hours per day (Hirshkowitz et al., 2015). The Stress Research Institute has shown that 'compressed working hours that entail working many days in a row, long shifts or with only limited rest time between shifts may lead to sleep deficit, stress and fatigue, and in the long term, poor health' (Kecklund et al., 2010).

Non-elderly care

Among women in six dental health workplaces, three study groups were created. One tested a 2.5-hour reduction of the work week without further intervention (RWH), while a second group was required to participate in 2.5 hours of moderate to vigorous exercise at work each week (PE). A third group served as a reference. The number of patients treated increased in all groups. RWH increased most. PE increased most in self-assessed productivity in the form of increased quantity of work, increased ability to work, and decreased sickness absence (von Thiele Schwarz and Hansson, 2011). Another study found that a shortened work day leads to decreased work-related neck and shoulder pain among healthcare workers (Wergeland et al., 2003).

RWH also have a beneficial impact on emotional state, fatigue, exhaustion, stress, memory and sleep (Barck-Holst et al., 2017), while a qualitative study at an orthopedic clinic demonstrated a more tenable work situation, improved balance between work and leisure, and improved quality of care (Gyllensten et al., 2017)

Elderly care

In Scandinavia 13 studies of RWH in elderly care were conducted between 1989 and 2016, including 11 in Sweden and two in Norway. All of these studies investigated whether shorter working hours would reduce sick leave and improve health among AN. One study concerned a reform that had a duration of 16 years (Eggvall, 2006). Sick leave declined in six of the studies and AN health improved across the board. Four studies (Stockholm stad, 2007) combined interventions that included RWH and wellness programs. In three of these studies, these changes resulted in health benefits. Some of the employees in one of these studies were unhappy with their jobs (von Thiele and Lindfors, 2006). While there are good reasons for combining interventions, they increase the difficulty of determining what intervention was responsible for the effects. Five of the thirteen studies were microstudies involving fewer than 40 employees. While important as pilot studies, none of the microstudies were tested on a larger scale. None of the 13 studies compared the results concerning all AN in the municipalities where the studies were conducted, and only a few of the studies included comparisons with nationwide studies on issues such as sick leave and health. Only a few of these studies included measures to compensate for loss of working hours. The studies that did not compensate for lost working hours did not entail isolated interventions aimed at a RWH, but instead were more general attempts to improve efficiency. One of several examples is a Stockholm study at a medical clinic (Olsson, 1994).The combination of reducing working hours with no corresponding reduction in duties may have a negative impact (Kecklund et al., 2010).

Testing and comparing models from other work sectors is associated with risks. For example, a Stockholm study tested the Toyota model, where mechanics were scheduled to work one of two six-hour weekday shifts at full pay. When the same concept was tested among elderly care personnel, continuity of care for patients deteriorated significantly – an impact opposite to that of improved Toyota customer satisfaction (Johansson, 2006). To achieve success, management must consider three perspectives: the mission, the elderly and the employees (Kajonius et al., 2016).

Summary of previous research

RWH in non-health care may lead to improvement in perception of health and sleep quality, decreased fatigue, reduced stress, less anxiety at bedtime, clear social benefits, improved wellbeing, and beneficial effects on work-family interaction, and evidence of improved physical health. Compressed working hours may lead to poor health.

RWH in non-elderly care is associated with a number of benefits: increased productivity, positive impact on restorative sleep, less stress, fewer memory problems, less emotional

negativity, less tiredness, fatigue and exhaustion. In addition, employees find their situation at work to be more tenable with an improved balance between work and leisure, and also feel they deliver improved quality of care.

RVH in elderly care; sick leave declined in six of thirteen studies and perceived health improved across the board. Positive health effects were found in three of four studies that combined RWH with wellness interventions.

Method

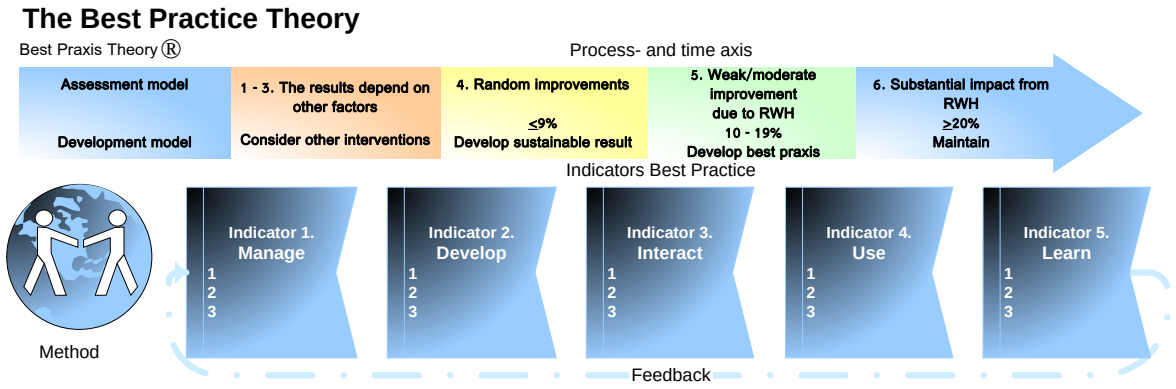
Theory

The underlying theory of this research concerned two issues. The first issue was to develop a framework for the current study, while the second concerned the degree to which intervention group results was due to a RWH.

1 Framework

The Best Practice Theory® (BPT) applied in this study was evidence-based (Lorentzon, 2013). The theory can be applied to research on work environment, employment, working life, social work and public health. Best practices undergo constant change due to the dynamic nature of the environment and associated conditions. In contrast, goals remain essentially static. BPT is divided into a four-step development module as illustrated in the diagram below (Figure 1).

Figure 1 The four steps of the Best Practice Theory



These steps begin with ‘The results depend on other factors” and culminate in ‘Substantial impact from RWH” and provide a stepwise measure beginning with ‘Consider other interventions’ and culminating with ‘Maintain.’ The implementation of this theory with its five circular concepts – Manage, Develop, Interact, Use and Learn – is aimed at changing all or part

of an organization and/or structure, as well as at achieving continuous improvement, which represents an important distinction compared with other best practice theories.

2 Degree to which intervention group results are due to reduced working hours

The following Best Practice Model (BPM) is used to assess effect sizes: are the results from the intervention group due to RWH, are they random, or do they depend on other factors? Improvements in intervention group results compared with the 2014 baseline are assessed as follows:

1. In cases where the intervention group show negative results, the change in the intervention group is considered to be due to factors other than the intervention.
2. In situations where results show that intervention group parameters remain unchanged, while control group parameters worsen, other reasons cannot be ruled out as a cause.
3. In cases where the intervention group and the control group show similar improvements, the change in the intervention group is considered to be due to factors other than the intervention.
4. Improvements of <9% are considered to be random.
5. Improvements of 10 – 19% reflect weak or moderate improvement due to RWH.
6. Improvements of 20% or more are considered to reflect a substantial impact from RWH.
7. Concerning sick leave, an improvement of ≥10% in the intervention group represents an effect of RWH.

Study design

This longitudinal, experimental evaluation of reduced weekly working hours for AN investigated the impact of RWH on the health and working conditions of AN employed in elderly care facilities. The trial period in the study, which was commissioned by the City Council of Gothenburg in Sweden, spanned from February 2, 2015 to January 1, 2017. The elderly care facilities were chosen following a process in which district councils, line managers and AN were asked whether they were willing to participate before enrollment. The study was organized through the efforts of three working groups: an AN' interest group, a work group for unit managers and coordinators, and a steering group to provide leadership and organizational context.

Intervention

The study consisted of two groups (intervention and control) of AN who worked at two elderly care facilities located in the same area and with similar infrastructures. The intervention group comprised 62 full-time equivalent (FTE) and 15 part-time (PT) AN working in an elderly care facility with 72 apartments. The control group had 30 FTE and 29 PT AN who worked at another elderly care facility with 73 apartments. The number of AN staffing the facilities was determined by the care and nursing needs of the residents in these facilities.

Under the agreement (Spång et al., 2014) FTE and PT AN in the intervention group were offered a full-time six-hour workday – compared with the usual full-time work week of 38.25 hours – at standard FTE wages for the duration of the trial period. The AN in the control group continued to work their regularly scheduled hours. All AN in the two groups provided written consent to participate in the study. In addition, the agreement stipulated that the AN could not take on other extra jobs during the study and were required to participate in surveys and physiological tests throughout the course of the study.

To ensure that residents in the intervention facility received equivalent care in light of the RWH in the intervention group, the City of Gothenburg hired 14.86 FTE AN. Thus, the total number of hours of care were divided among more AN in the intervention group. This measure was also necessary to ensure that working conditions for AN remained unchanged compared with prior to the trial. The study is designed to isolate the impact of RWH. Support from first-line managers for the AN remained unchanged and the organization of work duties also remained unchanged at the two elderly care facilities during the study. Briefly, the AN work in teams and are responsible for 18 quality-based procedures. Each AN serves as the contact person for one resident. These practices provide leeway for AN to carry out their care duties (Lorentzon, 2008) (Amble, 2017).

Parameters

In the current study, the impact of RWH on health was assessed based on anonymous aggregated data; sickness absence, self-reported level of satisfaction with personal health and physiological test data.

Sickness absence data

In this study, anonymous, aggregate data on sickness absence were collected and reported (Gothenburg City Council, 2017) as a mean value (MV) based on a ratio of cumulative hours of absence over cumulative regular working hours, in accordance with Swedish accounting

standards for FTE and PT AN (Swedish Association of Local Authorities and Regions (SALAR), 2017) [Figure 2].

Figure 2 Calculation of sickness absence

$$\text{Ratio of sickness absence} = \frac{\text{Cumulative sick leave times in hours}}{\text{Cumulative regular working hours}}$$

For the purposes of the current study, data on sickness absence were collected from both the intervention and control groups, as well as from all 2 716 AN working at elderly care facilities in the City of Gothenburg, to be used as a reference group. For AN who were absent due to sickness during the two-year study period, data were reported annually as follows: any sick leave at all, sick leave ≤14 days, or sick-leave ≥15 days. In addition, data pertaining to sickness absence were obtained for the year prior to and the year following the trial. The effects of RWH on sickness absence were expressed as a change in the above ratio (percent decrease or increase) and then compared with the corresponding categories of sick leave data from 2014 (the year before the trial period).

Perceived satisfaction with personal health and physiological health data

AN in both intervention and control groups self-reported their perceived satisfaction with personal health using anonymous answers to a standardized wellness survey. In addition, parameters were obtained through physiological testing, including blood pressure (BP), BMI and estimated VO_2max using a submaximal bicycle ergometer test. Survey responses and the physiological tests were classified into nine categories to measure, MV how the work environment and other determinants may influence health prior to and after the trial period. The effect of the RWH in each categories was then calculated as a percent of improvement and/or worsening and compared with the data obtained prior to the trial period.

Results

Number of assistant nurses and reported data

The Human Resources department, Gothenburg City gathered and reported aggregate data on sickness absence annually (i.e. 2014, 2015, 2016 and 2017) on all FTE and PT AN (77 in intervention group and 59 in control group)[1]. Figures for FTE AN with complete wellness survey and physiological testing data are presented below. Prior to trial start 100% of AN participated in the wellness survey. After completion of trial, 98% of AN in the intervention

group respectively 90% in the control group participated in the wellness survey. Figures in parentheses show the total number of FTE AN (Table 1).

Table 1 Sickness absence for all FTE and PT AN. Figures for FTE AN with complete wellness survey and physiological testing data are presented below. Figures in parentheses show the total number of FTE AN.

	Intervention group	**Control group**
	AN FTE and PT	
Sickness absence, HR data	77 AN[1]	59 AN[1]
Standardized wellness survey	**Completed questionnaires/ AN FTE**	
	62 AN	30 AN
2015 prior to trial start	62 (62)	30 (30)
2017 after completion of trial	61 (62)	27 (30)
Physiological test	**Completed test/ AN FTE**	
	62 AN	30 AN
2015 Testing prior to trial start. BMI, BP	50 (62)	30 (30)
2017 Test after completion of trial. BMI, BP	51 (62)	20 (30)
2015 $V0_2$max, prior to trial start	50 (62)	30 (30)
2017 $V0_2$max, after completion of trial	39 (62)	18 (30)

[1] The number of AN staffing the facilities was determined by the care and nursing needs of the residents in these facilities.

Sickness absence

Table 2 below presents study data on sickness absence in the intervention, control and reference groups, respectively, including cumulative sickness absence and change in % for the categories any sick leave at all, ≤ 14 days and ≥ 15 days during the year prior to the study (2014), the study years (2015, 2016) and the year after the study (2017).

Table 2 Cumulative sickness absence and change in %, any sick leave at all, ≤ 14 days and ≥ 15 days for the year prior to the study (2014), study years (2015, 2016) and year after the study (2017)

	Sickness absence (%) [1]			**(-) Decrease / (+) Increase in percentage (%) compared with 2014**		
	Intervention group	**Control group**	**Reference**	**Intervention group**	**Control group**	**Reference**
Any sick leave at all						
2014	7.90	9.40	10.60	N/A	N/A	N/A
2015	6.80	9.60	12.00	-13.9	+2.1	+13.2
2016	7.10	12.70	12.30	-10.1	+35.1	+16.0
2017	9.60	13.00	11.90	+21.5	+38.3	+12.3
Sick leave ≤ 14 days						
2014	2.90	3.60	2.80	N/A	N/A	N/A
2015	2.70	3.50	3.00	-6.9	-2.8	+7.1
2016	2.70	4.00	3.00	-6.9	+11.1	+7.1
2017	3.10	3.50	3.00	+6.9	-2.8	+7.1

	Sickness absence (%) [1]			(-) Decrease / (+) Increase in percentage (%) compared with 2014		
	Intervention group	**Control group**	**Reference**	**Intervention group**	**Control group**	**Reference**
Sick-leave ≥ 15 days						
2014	5.00	5.80	7.80	N/A	N/A	N/A
2015	4.10	6.10	9.00	-18.0	+5.2	+15.4
2016	4.40	8.70	9.30	-12.0	+50.0	+19.2
2017	6.50	9.50	8.90	+30.0	+63.8	+14.1

[1] Sickness absence as a ratio of cumulative hours of absence divided by cumulative regular working hours

Sickness absence in the intervention group decreased slightly from its original low level during the two-year trial [Table 2]. Sickness absence in the intervention group remained stable for the categories any sick leave at all, ≤14 and ≥15 days over the course of the two-year trial. A sharp increase in sickness absence in the ≥15 days category was noted within the intervention group in particular after the trial period. Sickness absence was consistently higher in the control group than in the intervention group. Sickness absence increased across the board within the control group. The greatest difference was seen in sick leave ≥15 days. This increase within the control group was consistently observed for the period 2014 – 2017 and a similar trend was observed in the reference group.

Perceived satisfaction with personal health and physiological health data

An external independent company was responsible for conducting the survey and physiological testing, as well as for collecting and processing the self-reported anonymous answers from AN before and after the trial period (Previa AB, 2017). All analyses in the current study were based on anonymized, aggregate data. Table 3 below shows each study parameter for perceived satisfaction with personal health in the intervention and control groups, respectively, prior to (2014) and after (2017) the trial period.

Table 3 Perceived satisfaction with personal health and physiological health data prior to and after the trial period, Imp. (+) (Improvement), Worse (-) (Worsening) (Previa AB, 2017)

	Intervention group			**Control group**		
Level of satisfaction	**Prior to trial MV**	**After trial MV**	**Imp. (+) Worse. (-) %**	**Prior to trial MV**	**After trial MV**	**Imp. (+) Worse. (-) %**
1) Fatigue, energy						
a) Fatigue	39	59	+51	33	11	-67
b) Amount of time to complete duties at work	34	54	+59	27	26	-4
c) Energy left when I get home	21	51	+143	20	7	-65

	Intervention group			Control group		
Level of satisfaction	**Prior to trial MV**	**After trial MV**	**Imp. (+) Worse. (-) %**	**Prior to trial MV**	**After trial MV**	**Imp. (+) Worse. (-) %**
d) Balance between work and leisure	37	51	+38	40	19	-53
2) Stress						
a) Stress at work	19	39	+105	13	7	-46
b) Stress symptoms caused by work	32	56	+75	40	15	-63
c) Disturbed by job thoughts in leisure time	61	62	+2	60	37	-39
d) Disturbed sleep, difficulty sleeping	65	67	+3	60	44	-27
e) Sleeps well	44	56	+27	37	30	-19
3) General symptoms						
a) Restless, tense	68	72	+6	63	63	±0
b) Irritability, impatience	77	87	+13	70	74	+6
c) Depressed, listless, sad	79	80	+1	70	70	±0
d) Abdominal symptoms	73	66	-10	80	67	-16
e) Headache	69	77	+12	77	52	-32
4) General health						
a) Perceived health	55	61	+11	47	26	-45
5) Psychosocial workplace environment						
a) Leeway to implement the care work	53	56	+6	30	15	-50
b) Supervisor feedback	66	46	-30	47	59	+26
c) Support from others at work	79	77	-3	63	63	+0
d) Work relationship with supervisor	74	59	-20	57	67	+18
e) Work relationship with team	79	70	-11	73	56	-23
f) Job satisfaction	85	84	-1	67	74	+10
g) Skills development	65	61	-6	43	56	+30
h) Participation in workplace	65	66	+2	47	42	-11
6) Physiological results						
a) $V0_2max$ ($\geq$ 35 mlO2/kg*min)	20	23	+15	24	28	+17
b) Systolic BP ($\leq$140/90 mmHg)	78	85	+9	87	84	-3
c) Diastolic BP ($\leq$140/90 mmHg)	84	83	-1	93	74	-20
d) BMI	40	39	- 3	47	50	+6
e) Perceived basic physical activity	29	36	+24	37	22	-41
7) Musculoskeletal symptoms						
a) Neck	53	59	+11	47	41	-13
b) Shoulders	40	54	+35	43	26	-40

	Intervention group			Control group		
Level of satisfaction	**Prior to trial MV**	**After trial MV**	**Imp. (+) Worse. (-) %**	**Prior to trial MV**	**After trial MV**	**Imp. (+) Worse. (-) %**
c) Elbows	82	80	-2	83	67	-19
d) Wrists, hands	58	51	-12	57	15	-74
e) Back, upper	58	66	+14	43	33	-23
f) Back, lower	42	54	+29	20	11	-45
g) Hips	76	74	-3	57	44	-23
h) Knees	66	62	-6	50	33	-34
i) Ankles, feet	63	62	-2	50	33	-34
j) Sick leave due to musculoskeletal problems	71	90	+27	60	59	-2
8) Healthy diet and eating habits						
a) Fruit, daily	63	59	-6	67	63	-6
b) High-fiber vegetables	89	79	-11	80	78	-3
c) Low-fat dairy products	37	33	-11	33	30	-9
d) Beneficial fats	68	67	-2	67	74	+10
e) Eat breakfast	92	80	-13	92	89	-3
f) Hot lunch at work	73	79	+8	57	59	-4
g) Avoid sweets	58	56	-3	57	44	-23
9) Tobacco, alcohol						
a) Not smoking	71	66	-7	77	74	-3
b) Not drinking	55	57	+4	23	33	+4

Improvements of 20% or more in level of satisfaction within the intervention group were found for the following parameters: fatigue (+51%), amount of time to complete duties at work (+59%), energy left when I get home (+142%), balance between work and leisure (+38%), stress at work (+105%), stress symptoms caused by work (+75%), sleep (+27%), basic physical activity (+24%), musculoskeletal symptoms involving shoulders (+35%) or lower back (+29%), and sickness absence due to musculoskeletal problems (+27%). *Improvements of 10 – 19%* in level of satisfaction within the intervention group were found for the following parameters: irritability and impatience (13%), headache (+12%), musculoskeletal symptoms involving neck (+11%) or upper back (+14%), and perceived general health (+11%).

Unimproved of 9% or less in level of satisfaction within the intervention group were found for the following parameters: Disturbed by job thoughts in leisure time (+2%), disturbed sleep, difficulty sleeping (+3%), restless, tense (+6%), depressed, listless, sad (+1%), leeway to implement the care work (6%), supervisor feedback (-30%), support from others at work (-3%), work relationship with supervisor (-20%), work relationship with team (-11%). job satisfaction (-1%), skills development (-6%), participation in workplace (+2%) systolic BP (+9%), diastolic BP (-1%), BMI (-3%), musculoskeletal symptoms involving elbows (-2%), wrists, hands (-12%), hips (-3%), knees (-6%), ankles, feet (-2%), healthy diet and eating habits involving fruit

(-6%), daily high-fiber (-11%), vegetables, low-fat dairy products (-11%), beneficial fats (-2%), eat breakfast (-13%), hot lunch at work (+8%), avoid sweets (-3%), not smoking (-7%) and not drinking (+4%).

Discussion

The purpose of this study was to answer 1) - what has improved in health and working life for nurses through RWH and what was unchanged or worsened. 2) - Whether there was a relationship between unchanged / worsened results in this study and health and working conditions. 3) How the results can be applied and how changes can be implemented for a sustainable health and working life for nurses.

The approach followed the framework of Best Practice Theory with its five circular concepts – manage, develop, interact, use and learn (albeit in different order) and included recommendations to promote a sustainable working life experience and health for AN.

Applicability of findings

The Best Practices Model evaluated effect sizes of RWH. Improvements of 20% or more are considered to reflect a substantial impact of RWH, improvements of 10 – 19% reflect weak or moderate improvement and improvements of ≤9% are considered to be random. According to the model, the improvements in the intervention group need to be independent of those from the control group. In cases where the intervention group and the control group show similar improvements, the change in the intervention group is considered to be due to factors other than the intervention. Concerning sick leave, an improvement of ≥10% in the intervention group represents an effect of RWH. Other results are not due to RWH.

The finding of this study was perceived satisfaction of health in key areas that impact both work and leisure, which reflected a substantial impact or a moderate/weak effect of a RWH. Any other lesser changes was either random or negligible, and did not represent change due to RWH.

The degree of change in sickness absence within the intervention group was a minor effect of a RWH. Long-term sick leave of ≥ 15 days was a serious indicator for health concerns within the organization and this situation did occur before, during and after the trial RWH in the control and reference groups. After the conclusion of the trial period, sickness absence ≥ 15 days rose sharply within the intervention group.

The RWH seen in this study promoted a sustainable working life and was considered to have a substantial impact, which was clearly in line with previous research. The benefits observed in the current study were improvements in fatigue, stress, time to complete duties, energy, balance between work and leisure, sleep, basic physical activity, musculoskeletal symptoms and general health. However, the main finding was unexpectedly something different – a finding that was quite peripheral in prior studies. Based on the risks to which this population group was exposed, a RWH as an isolated intervention is insufficient on its own to substantially improve health, as shown by various indicators relating to lifestyle and work environment. Multiple interventions are required to successfully improve the health of AN. To put the situation in context, 80% of female employees from various industries in Sweden perceive their health to be very good (Public Health Agency of Sweden, 2015), compared with 61% in the intervention group and 26% in the control group after the trial period (Previa AB, 2017). The results from this study indicated the importance of a RWH.

Lessons learned

In order to isolate the impact of RWH, both management involvement and support to the AN remained unchanged as well as the organization during the trial. This study showed negligible effects required by management. In areas that required AN to take personal initiative, the effects were either absent or inadequate. The study showed that this RWH did not directly improve the psychosocial workplace environment, nor did it motivate personal initiative, with the exception of basic physical exercise, to adopt a healthy diet and eating habits or otherwise improve health based on physiological parameters. However, a RWH fosters improvement in health, presenteeism and energy to communicate by creating the space needed to implement additional interventions to reduce the ill effects on health from work environment and living conditions for AN.

Cooperation

When planning interventions to reduce working hours a thorough review of procedures is needed to achieve improved work flow. The review must determine priorities regarding care and nursing procedures. Breaks must be built in to the schedule. First-line management must be directly involved with interventions because AN need and want such interaction with their supervisors. Such interventions refer to organizational changes and it is essential that AN have a voice and actively participate in the planning from the onset in order for the interventions to be successful. The first Swedish workplace democracy projects in the 1960s demonstrated that

substantial gains could be achieved when workers were given the opportunity to co-determine and contribute to project design and structure (Karlsson, 1969). Moreover, previous research has shown that to achieve success, management must consider three perspectives: the mission, the elderly and the employees (Kajonius et al., 2016)

Planning future direction

The following five markers of ill health should be prioritized when designing interventions in accordance with the development model, along with a RWH. To solve the work environment and life style issues that cause the problems, interventions are needed at the individual level where health problems arise, as well as at the workplaces and the public health level to benefit AN.

1) Basic physical exercise during leisure time, which is fundamental for good health, improved by 24% to an average level of satisfaction of 36% in the intervention group (Previa AB, 2017), albeit compared with a 66% level of satisfaction among female employees from various industries in Sweden (Public Health Agency of Sweden, 2016). A 25% RWH among full-time workers resulted in increased time spent in recovery activities (Schiller et al., 2018). VO_2max did not improve with RWH in the intervention group. Reduction of mortality and prevention of cardiovascular disease requires at least 30 – 60 minutes of exercise daily (Elinder Schäfer et al., 2006), a benefit that did not arise from the trial period. Perceived satisfaction of general health improved, though not substantially, while factors such as fatigue, energy, stress, pain and daily habits posed obstacles to physical activity. In the current study, satisfaction with musculoskeletal symptoms may reflect weak or moderate improvement due to a RWH in the intervention group. Exercise of all muscle groups is necessary for good health. Shortening the workday improves work-related neck and shoulder pain among healthcare workers (Wergeland et al., 2003). The wide spread in the distribution of results in the current study may reflect variations in the time required for different joints to recover (Sharma et al., 2015).

2) Healthy diet and eating habits are crucial for improved health and reduced health risks. This study showed no improvement in choice of healthy ingredients or eating habits. The integrity of individuals to make healthy choices has its limitations. Crucial steps toward change must therefore be taken by the AN through personal insight and initiative. Meanwhile, the positive energy generated by the teams working together must be harnessed. Interventions such as those

described above should be planned in consultation with dieticians and professional health promoters.

3) The psychosocial work environment did not improve as a result of the trial. However, the organizational change (i.e. the intervention) during the trial might have had a negative impact on the results. Another reason might be that support from first-line managers remained unchanged during the study. Because the study is designed to isolate the impact of RWH. A satisfactory workplace environment is both a requirement for health and essential for professional interaction.

4) It is crucial that healthcare organizations across the board both embrace and promote sustainable healthy workplaces, thereby empowering the personnel. Core values of human resource policy will also shape customer perception of services.

Manage

5) Ill-health reduces productivity and increases healthcare costs among AN. The work environment is a competitive factor for hiring and retaining AN. A shortage of AN increases the risk of problems in the workplace and compromises the mission of elderly care. Success requires efforts in vital areas that promote long-term sustainable working conditions, which can potentially transform the entire organization. Policy makers have a strategic responsibility for public health. Additional focused interventions are needed to benefit high-risk population groups such as AN since the work environment does not constitute a self-healing system. Employers must take the initiative to solve the growing challenges that lie ahead. A long-term approach requires sustainable strategically positioned Human Relation Management (HRM) where the employers set the terms and conditions. The current situation should not be accepted as the norm, but rather viewed as a deviation. The challenge to first-line managers is to deliver sustainable outcomes for healthy workplaces. In order to succeed, a strategy for managing obstacles in the organization is required (Larsson et al., 2015).

Conclusions

The purpose of this study was to determine if it is sufficient to RWH in order to improve health and working life for AN and to explore if other potential interventions were required. The major findings of this study consistently showed a substantial improvement in perceived

health directly resulting from RWH. However, no finding of beneficial effects were observed in psychosocial workplace environment, physiological test results and personal motivation to improve health. Based on the working and health conditions AN had in this study a RWH as an isolated intervention was insufficient on its own to substantially improve health, as shown by various indicators relating to lifestyle and work environment.

The current situation should not be accepted as the norm, but rather viewed as a deviation. Ultimate success requires multiple interventions. A RWH creates conditions that foster improvement in health and other parameters, providing the space needed for first-line management to implement additional interventions. The recommendation is to expand upon the result in the current study in order to achieve best practices. A reasonable goal would be to increase the working and health conditions of the AN to the general level of working Swedish women. This is the challenge for achieving long-term sustainable health and working conditions.

Acknowledgements

Special thanks:

Reading and comments: Professor Emeritus Bengt Furåker, Department of Sociology and Work Science, University of Gothenburg, Sweden. Acting Professor in Technical Psychology Lars-Åke Lindberg, Department of Work Science, Luleå Technical University, Acting Professor, Department of Social Work, Umeå University Sweden.

Abbreviations

AN – Assistant nurse.

BMI – Body Mass Index.

BP – Blood pressure.

BPM - Best Practice Model.

BPT – Best Practice Theory.

FTE – Full-Time Equivalent.

HR – Human Resource.

HRM – Human Relations Management.

Imp. (+) – Improving.

MV - Mean Value.

PE – Physiological Exercise

PT - Part-Time.

RWH – Reduced Working Hours.

WHP - Workplace Health Promotion.

$V0_2max$ - Cardiorespiratory fitness.

Worse. (-) – Worsening.

Figure legend

1 The four steps of the Best Practice Theory.

2 Sickness absence ratio.

References

Åkerstedt, T., Knutsson, A., Westerholm, P., Theorell, T., Alfredsson, L., Kecklund, G., 2002. Sleep disturbances, work stress and work hours: A cross-sectional study. Journal of Psychosomatic Research 53, 741–748. https://doi.org/10.1016/S0022-3999(02)00333-1

Akerstedt, T., Olsson, B., Ingre, M., Holmgren, M., Kecklund, G., 2001. A 6-hour working day - effects on health and well-being. Journal of Human Ergology 30, 197–202. https://doi.org/10.11183/jhe1972.30.197

Amble, N., 2017. A learning organization in practice: Service development in care work. Nordic journal of working life studies, 20172245-0157 Volume 7. https://doi.org/10.18291/njwls.v7iS2.96695

Anttila, T., Nätti, J., Väisänen, M., 2005. The experiments of reduced working hours in Finland. Impact on work–family interaction and the importance of the sociocultural setting. Community, Work & Family 8, 187–209. https://doi.org/10.1080/13668800500049704

Arbetsmiljöverket, 2014. Projektrapport - Inspektioner av kvinno- och mansdominerad kommunal verksamhet, hemtjänst och teknisk förvaltning, Rapport 2014:3 (Inspections of male and female- dominated municipal activities, home care services and technical adminstration). (No. REM 2012/100494). Arbetsmiljöverket (Swedish Work Environment Authority).

Barck-Holst, P., Nilsonne, Å., Åkerstedt, T., Hellgren, C., 2017. Reduced working hours and stress in the Swedish social services: A longitudinal study. International Social Work 60, 897–913. https://doi.org/10.1177/0020872815580045

Bildt, C., Akerstedt, T., Falkenberg, H., Ingre, M., Kecklund, G., Larsson, I., Nyfjäll, M., Sandberg, T., 2007. Arbetstidsförkortning och hälsa: försök med sex timmars arbetsdag inom offentlig sektor (Reduced working hours and health: trials with six-hour workday within the public sector) 005:11 ISBN: 9789170458293. Arbetslivsinstitutet, Stockholm.

Eggvall, J., 2006. Sex timmarsdagen i Kiruna: en utvärdering av arbetstidsförkortningen inom hemtjänsten 1989 - 2005 (Six-hour workday in Kiruna: an evaluation of reduced working hours in home health services 1989 - 2005) [WWW Document]. URL https://blogg.kommunal.se/utredare/files/2011/04/Sextimmarsdagen_i_Kiruna_2006.pdf

Ekblom-Bak, E., Ekblom, Ö., Andersson, G., Wallin, P., Söderling, J., Hemmingsson, E., Ekblom, B., 2018. Decline in cardiorespiratory fitness in the Swedish working force between 1995 and 2017. Scandinavian Journal of Medicine & Science in Sports. https://doi.org/10.1111/sms.13328

Elinder Schäfer, L., Faskunger, J., von Hartman, F., Lamming, P., Swanberg, I., 2006. Fysisk aktivitet och folkhälsa (Physical activity and public health) 2006:13 Statens Folkhälsoinstitut. Statens folkhälsoinstitut, Huskvarna.

Gothenburg City Council, 2017. HR 2014-2017. Gothenburg City Council, HR, Gothenburg.

Grünewald-Zetterberg, K., Vikenmark, S., Hellsing, E., 2014. Trender och prognoser 2014 (Trends and Forcasts 2014 - 2035 Population, education and labour market in Sweden), AM85 - Trender och prognoser. Statistiska Centralbyrån, SCB /Swedish Forcast Institute.

Gyllensten, K., Andersson, G., Muller, H., 2017. Experiences of reduced work hours for nurses and assistant nurses at a surgical department: a qualitative study. BMC Nursing 16. https://doi.org/10.1186/s12912-017-0210-x

Hirshkowitz, M., Whiton, K., Albert, S.M., Alessi, C., Bruni, O., DonCarlos, L., Hazen, N., Herman, J., Katz, E.S., Kheirandish-Gozal, L., Neubauer, D.N., O'Donnell, A.E., Ohayon, M., Peever, J., Rawding, R., Sachdeva, R.C., Setters, B., Vitiello, M.V., Ware, J.C., Adams Hillard, P.J., 2015. National Sleep Foundation's sleep time duration recommendations: methodology and results summary. Sleep Health 1, 40–43. https://doi.org/10.1016/j.sleh.2014.12.010

Johansson, P., 2006. Hur upplever brukarna Toyota- modellen inom Hägerstens och Skärholmens stadsdelar? (How do clients experience the Toyota model in elderly care in the Hagersten and Skarholmen neighbourhoods?). KC -Kompetenscentrum, Kompetensfonden, Stockholm stad.

Jonsson, C., Sjöström Ross, Å., Carlsson, A.-K., Fahlander, T., Carlemo, B., 2015. Hållbar arbetsmiljö med kvinnor i fokus, PM - reflektioner, erfarenheter och lärdomar från HAK 2012-2014 (Sustainable working environment with a focus on women - reflections, experiences and lessons from HAK 2012 - 2014) (No. 2015:9), REM 2012/100494. Arbetsmiljöverket (Swedish Work Environment Authority), Stockholm, Sweden.

Kajonius, P., Kazemi, A., Tengblad, S., 2016. Organizing principles and management climate in high-performing municipal elderly care. Leadership in Health Services 29, 82–94. https://doi.org/10.1108/LHS-06-2015-0018

Karlsson, L.E., 1969. Demokrati på arbetsplatsen (Democracy in the workplace) libris.kb.se, LIBRIS-ID:8079902, Verdandi-debatt nr 47. Bokförlaget Prisma, Föreningen Verdandi, Gummessons Boktryckeri AB Falköping 1969.

Kecklund, G., Ingre, M., Åkerstedt, T., 2010. Arbetstider, hälsa och säkerhet en uppdatering av aktuell forskning (Work hours, health and safety – an update of recent research, Stress Research Reports No 322). Stressforskningsisnstitutet och författarna, Stockholm.

Larsson, R., Stier, J., Åkerlind, I., Sandmark, H., 2015. Implementing Health-Promoting Leadership in Municipal Organizations: Managers' Experiences with a Leadership Program. Nordic Journal of Working Life Studies 5, 93. https://doi.org/10.19154/njwls.v5i1.4767

Lorentzon, B., 2013. Best Praxis (the Best Practice Theory). 511281.

Lorentzon, B., 2008. Tankeram för en processorienterad vård och omsorg (Think tank; process oriented nursing and social services) (R&D). Pacta Guideline, Helsingborg Sweden.

Mackenbach, J.P., Stirbu, I., Roskam, A.-J.R., Schaap, M.M., Menvielle, G., Leinsalu, M., Kunst, A.E., 2008. Socioeconomic Inequalities in Health in 22 European Countries. New England Journal of Medicine 358, 2468–2481. https://doi.org/10.1056/NEJMsa0707519

Munck af Rosenschöld, P., 2016. Jobbhälsobarometern (The job health barometer) (Delrapport 2016:2). Sveriges Företagshälsor.

National Insurance Authority, 2016. Högst sjukfrånvaro för kvinnor som jobbar inom vård- och omsorg, Försäkringskassan (Highest sickness absence for women who work in health care and social services, Social Insurance Agency) [WWW Document]. URL https://www.forsakringskassan.se/wps/wcm/connect/c15e66f0-da75-477e-9013-7883df905ab2/PM-bilaga-sjukfranvaro-olika-branscher-161123.pdf?MOD=AJPERES&CVID= (accessed 11.10.18).

Olsson, B., 1994. Kortare arbetsdag - en väg till ett mer ekologiskt arbetsliv? (Shorter work day - path to a more sustainable work life?) Stockholm, Univ., Diss. : 1994 Doctoral Thesis (monograph), Personalekonomiska institutets skriftserie. Stockholm University, Samhällsvetenskapliga fakulteten.

Previa AB, 2017. Tillfredsställande hälsa undersköterskor (perceived wellness questionnaire and physical health test, assistant nurses) 29 April 2015, 17 January 2017. Previa AB, Gothenburg.

Public Health Agency of Sweden, 2016. Public health study, interactive public health statistics (physical activity compared to economy, country of birth, socioeconomics, employment, education). Public Health Agency of Sweden.

Public Health Agency of Sweden, 2015. National Public Health Survey 2015, General Health (self-reported) by employment, gender and year. Folkhälsomyndigheten.

Public Health Agency of Sweden, Åkesson, N., Nilsson, K., 2011. Matvanor och livsmedel: kunskapsunderlag för folkhälsopolitisk rapport 2010 : målområde 10 (Eating habits and food. Knowledge base for the Public Health Policy Report 2010). Statens folkhälsoinstitut, Stockholm.

Schiller, H., Lekander, M., Rajaleid, K., Hellgren, C., Akerstedt, T., Barck-Holst, P., Kecklund, G., 2017. The impact of reduced worktime on sleep and perceived stress – a group randomized intervention study using diary data. Scandinavian Journal of Work, Environment & Health 43, 109–116. https://doi.org/10.5271/sjweh.3610

Sharma, J., Greeves, J.P., Byers, M., Bennett, A.N., Spears, I.R., 2015. Musculoskeletal injuries in British Army recruits: a prospective study of diagnosis-specific incidence and rehabilitation times. BMC Musculoskeletal Disorders 16. https://doi.org/10.1186/s12891-015-0558-6

Spång, E., Persson, H., Norrlin, P., Axhede, M., Ericsson, H., 2014. Kollektivavtal (Union Agreement) 2014-11-06, 2014-11-21.

Stockholm stad, 2007. Kompetensfonden 2003 - 2006. LIBRIS-ID:10362321. Kompetensfonden, Stockholms stad, Stockholm.

Stymne, J., Eriksson, L., Brännström Gullberg, S., 2018. The Swedish Occupational Register with statistics 2016, SCB (Webb article No. AM 33 SM 1801), Serie AM – Arbetsmarknad. Utkom den 7 mars 2018. Statistiska Centralbyrån SCB (Statistics Sweden).

Sverke, M., Falkenberg, H., Kecklund, G., Magnusson, L., Lindfors, P., 2016. Kvinnors och mäns arbetsvillkor – betydelsen av organisatoriska faktorer och psykosocial arbetsmiljö för arbets- och hälsorelaterade utfall (Working conditions of men and women - the importance of organizational factors and the psychosocial work environment for work and health-related outcomes) (Kunskapssammanställning 2016:2 (Research overview) ISSN 1650-3171 No. 2016:2). Arbetsmiljöverket (Swedish Work Environment Authority).

Swedish Association of Local Authorities and Regions (SALAR), 2017. Om den obligatoriska sjukfrånvaroredovisningen (Compulsary sickness absence report).

Szebehely, M., Stranz, A., Strandell, R., 2017. Vem ska arbeta i framtidens äldreomsorg? (Who will work in elderly care in the future?) (Arbetsrapport 2017:1 (Workingpaper/Department of Social Work) No. 2017:1). Institutionen för socialt arbete, Stockholms universitet, Stockholm.

van Stenis, A.R., van Wingerden, J., Kolkhuis Tanke, I., 2017. The Changing Role of Health Care Professionals in Nursing Homes: A Systematic Literature Review of a Decade of Change. Frontiers in Psychology 8. https://doi.org/10.3389/fpsyg.2017.02008

Vänje, A., 2015. Sick Leave—A Signal of Unequal Work Organizations? Gender perspectives on work environment and work organizations in the health care sector: a knowledge review. Nordic Journal of Working Life Studies 5, 85. https://doi.org/10.19154/njwls.v5i4.4845

von Thiele Schwarz, U., Hansson, H., 2011. Employee Self-rated Productivity and Objective Organizational Production Levels: Effects of Worksite Health Interventions Involving Reduced Work Hours and Physical Exercise. Journal of Occupational and Environmental Medicine 53, 838–844. https://doi.org/10.1097/JOM.0b013e31822589c2

von Thiele, U., Lindfors, P., 2006. Minskad sjukfrånvaro med regelbunden fysisk träning (Reduced sick leave with regular physical exercise) (Rapport inom äldreomsorgen 2005 - 2006). Kompetensfonden, Stockhols stad, Stockholm.

Wergeland, E.L., Veiersted, B., Ingre, M., Olsson, B., Åkerstedt, T., Bjørnskau, T., Varg, N., 2003. A shorter workday as a means of reducing the occurrence of musculoskeletal disorders. Scandinavian Journal of Work, Environment & Health 29, 27–34. https://doi.org/10.5271/sjweh.701