Working time arrangements

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WORKING TIME ARRANGEMENTS
A Tool To Improve Work Participation Of Nurses
Working In Residential Elder Care?

Velibor Peters

The research presented in this thesis was conducted at HAN University of Applied Sciences and at CAPHRI Care and Public Health Research Institute, Department of Social Medicine, of Maastricht University. CAPHRI participates in the Netherlands School of Public Health and Care Research CaRe.

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Working In Residential Elder Care?

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Voor Mirjam, Maeve en Veerle

General Introduction

Societal and demographic developments, such as a longer working life, a higher retirement age and low participation rates, increase the need to further examine work participation. The western population is 'greying': for example, it is estimated that, in the Netherlands, by 2038 about 25% of the population will be over 65 years of age (1, 2). Also, in the EU-27, between 2010 and 2030 the working population aged 55 to 64 years is expected to increase by about 16% (4). In the Netherlands, the old-age dependency ratio, i.e. the level of (financial) support given to older persons by the working-age population, will increase from 1:4 to 1:2 by 2038 (1). The ageing population poses important challenges for social security and welfare programmes including pensions, health care and long-term care. At a societal level, it is important to raise labour participation levels in view of the old-age dependency ratio. Apart from strategies to discourage early retirement and encourage a longer working life, special attention should be paid to raising the participation rates of women, older workers and starters on the labour market.

Participation is seen as an aspect of human functioning on a social and societal level, and the outcome of an interaction between a person's health, and their personal and environmental factors. This thesis focuses on sickness absence, reduced well-being and reduced motivation as major components of work participation (3, 5-7). In the Netherlands, the sickness absence rate is relatively high among women, older employees, employees with a low level of education, and employees with a chronic or long-term health problem (8). Participation rates differ between sectors, with each sector having its own distinctive problems (8-11).

In the Netherlands, the largest part of the total work force works in the healthcare sector, i.e. an estimated 18-22%. The healthcare sector has relatively high absence rates which are comparable to other sectors, such as public administration and transport (8). Moreover, in particular, the healthcare sector is threatened by a shortage of nurses on the labour market; this situation is likely to increase not only in the Netherlands, but also globally (12-14). Importantly, a nursing shortage may jeopardise the efficiency and quality of care (15).

Of all healthcare employees, about 30% works in elder care (8, 16), making elder care the largest employer within the healthcare sector. Of this 30%, 62% works in residential elder care (16). In the Dutch healthcare sector, nurses working in residential elder care have among the highest sickness absenteeism levels and are exposed to a relatively poor work environment (17). In addition, this subgroup of nurses has among the highest rates for job leave in the healthcare sector and often shows the lowest levels of job satisfaction (17, 18).

Moreover, the shortage of residential elder care nurses will increase due to the demographics of the nursing population, i.e. fewer young nurses enter elder care to replace those who leave. The proportion of older nurses (aged > 55 years) is increasing and a relatively high proportion move from employment into retirement. Also, it is a predominantly female and increasingly older-aged population, two characteristics which are associated with higher rates of sickness absence (8, 19, 20). The shortage of nurses is also expected to increase due to an expanded demand for

nurses, i.e. the increasing life expectancy and the ageing of the general population will lead to an increasing demand for elder care services. Furthermore, due to longevity and improved medical treatment, there is a growing number of persons with a chronic disease, which implies higher and more complex care requirements. Consequently, there will be an increasing demand for especially higher-educated nursing personnel as well as (evolving) new skills in elder care (16, 21). Therefore, care organisations need to consider how to increase the labour participation of nurses in residential elder care in order to maintain the quality of care at a high level. In the context of this thesis, labour participation refers to nurses who are aged 18 years and over and who have (at least) one type of formal job attachment with the participating care organisations.

In conclusion, and in line with the Action plan for the EU health workforce (22, 23), studies are needed that offer insight into how to promote the participation of nurses working in residential elder care. This need was recently emphasised by the Dutch Government and by national organisations for nurses working in elder care (24, 25). Although technical innovations (e.g. robots and telemetry) and social innovations (e.g. innovative assisted-living centres) may reduce the workload, these innovations will not entirely solve the problem of a nursing shortage. Therefore, there is an ongoing need to focus on nurses already working in residential elder care and their sustainable employment; this is the main aim of the work in this thesis.

DETERMINANTS OF LABOUR PARTICIPATION OF NURSES

Labour participation is a multifaceted and complex phenomenon which may involve i) work-related factors, ii) personal factors, and iii) health-related factors. In this thesis, the International Classification of Functioning, Disability and Health (the ICF), extended with the model of Van Dijk (3), was considered to be a suitable frame of mind to study the labour participation of residential elder care nurses, since it acknowledges the role of contextual factors (Figure 1). The ICF encompasses functioning as a universal human experience that can be conceptualised and classified from different perspectives, i.e. the perspective of the body (body functions and structures), of the individual (activities), and of society (including labour participation). Functioning can be influenced by a disease/disorder, as well as by external factors (e.g. work environment, family life, organisational features) and personal factors. In this thesis, the terms 'health' and 'health state' are used to indicate both the (threatening) disease/disorder, and the functioning of the person. This is in accordance with the broad definition of health as reported by the World Health Organisation ('*Health is a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity*'). In line with this expanded ICF framework, three domains of external factors emerge that might influence the labour participation of nurses working in residential elder care: 1) work-related external factors, which also encompass working time arrangements, 2) home-related external factors, and 3) personal factors. In the ICF framework, participation is seen as an aspect of functioning and

is conceived as a dynamic interaction between the other aspects of functioning and the external factors. These three domains of external factors are also underpinned by other work stress models that assume comparable factors, and their interactions, to influence participation (26-29). These work-related and home-related external factors, as well as the personal factors and the potential of resources, are described below.

Figure 1: The ICF framework used to describe work related factors (3)

Work-related external factors

Research in general, and among nurses in particular, shows that work-related factors play a role in adverse work outcomes, e.g. ill health and sickness absence (20, 30-36). Due to the increasing nursing shortage, job demands are likely to increase in the near future. Both Labriola et al. (37) and Nielsen et al. (38) reported that differences in physical and psychosocial work environment exposures account for a substantial part of the cases of high sickness absence. In general, an estimated 25% of sickness absence prevalence in 2005 and 22% in 2010 was found to be work related (39). However, most of these findings were based on health-related theories regarding the unhealthy workplace, stemming from the work stress paradigm (28), such as the Job Demand-Control model (40, 41) or the Job Demands-Resource model (42). In particular, work-related demands for nurses working in residential elder care are the physical job demands (e.g. lifting, or twisted working positions) and the psychosocial demands (e.g. time pressure, emotional demands, and lack of supervisory support) (11, 34, 43, 44).

Work schedule-related external demands

Another specific demand is the working time arrangement of a nurse, including shift work and the actual number of working hours. Shift work is inextricably bound with nursing in residential elder care. In research, shift work is often broadly defined as working outside the normal daytime

hours (45-47). In Europe, besides a regular day shift, about 80% of the nurses has to work in some kind of irregular work schedule (18). However, work schedules are becoming more diverse (48, 49) and the work schedule of nurses usually changes during their career. In the Netherlands, the numbers of hours worked are an import aspect of the job and vary considerably due to the widely accepted options for part-time work (50); in addition, compared with other European countries, the Netherlands is a leading country regarding part-time work (51). Also internationally, a wide variety of work schedules is found among healthcare personnel (52). Importantly, in contrast with (for example) industrial sectors that generally have 8-hour shifts provided in 2, 3 or 5 shifts (53), the number of hours worked by nurses in residential elder care is hardly related to the work schedule (54). Moreover, a proportion of the working hours is vulnerable to change, causing unpredictable and uncontrollable work schedules.

The negative effects of shift work on health and participation is well documented, whereas studies on the specific effects of shift work for nurses working in residential elder care are scarce. However, such research is important, because shift work is associated with a wide range of negative consequences and includes self-rated health, fatigue, work-home interference, job satisfaction, decline in performance, sick leave, and even cancer (27, 55-63). Several mechanisms are assumed to explain the effect of shift work on participation in terms of well-being, motivation and sickness absence. According to Knutsson (59) and Barton et al. (64), work schedule features (or shift work) can affect health and well-being, mediated by a mismatch of sleep-wake cycles and other important biological rhythms, as well as sleep problems, lifestyle changes, or disturbed family and social life.

Besides being related to health problems, shift work is also linked to sick leave. However, data in relation to sick leave are not consistent and the underlying causal pathway remains unclear. For example, shift work has been judged by healthcare workers to be a demand or hindrance whereas, according to observer ratings, shift work has also been valued as a resource (65). These conflicting findings emphasise: i) the need for research on the specific effects of shift work on nurses working in residential elder care, as well as ii) the need to describe how work-related factors, particularly the type of work schedule, is perceived by nurses. A meta-analysis performed by Merkus et al. (46) suggests that the association between shift work and sickness absence may be schedule and population specific. Bourbonnais et al. (66) and Tuchsén et al. (67) found effects for fixed evening work on sickness absence among female nurses. Furthermore, work schedules and working hours are also high on the list of factors that contribute not only to nurses leaving the profession, but also to a decreasing quality of care (31, 49, 68-72). Recent findings show that a large proportion of nurses working in elder care is still dissatisfied with the measures taken with respect to roster and working times, and with respect to balancing work and family (73).

Home-related external demands

Home characteristics, having children at home and/or being a caregiver also need to be considered when investigating health, job and sick leave in nurses in elder care. The work and family domain are inextricably bound with each other (26, 29, 74, 75), particularly for this mainly female nursing population that is expected to combine work and care for children (76). Nurses may experience stress not only because of their work, but also because of the interaction between their work and home situation (68, 77). Nurses with a demanding home situation probably need to invest more effort in order to arrange and fulfil their responsibilities. This could lead to a depletion of resources (74, 75, 77-79) and eventually result in health problems. This means that home demands and resources are mediated by health and/or motivation. For example, in their longitudinal research among white-collar workers, Ten Brummelhuis et al. (74) found that psychosocial home demands predicted sickness absence duration via health problems. With respect to nursing, the combination of many tasks and little social support at home is associated with health problems (77, 79, 80). Although home characteristics might be important in predicting the sickness absence of nurses, the effects of home characteristics on sickness absence is not well documented (74).

POTENTIAL ROLE OF RESOURCES

The above-mentioned studies demonstrate that nursing can be a highly demanding and complex job. A central hypothesis of this thesis is that certain resources have the potential to buffer the negative effect of demands on the participation problems of nurses working in residential elder care. Despite the growing interest in the *benefits* of work (instead of focusing on only negative effects), such benefits have hardly been reflected in conceptual frameworks in research on nurses working in residential elder care (81). In this thesis, the 'Conservation of Resources' (COR) theory (82-84) is considered appropriate in order to emphasise the effect of demands, as well as that of resources, on health, work engagement, well-being and participation. According to the COR theory, people attempt to obtain, retain, and protect resources. Stress results when they risk or actually lose these resources, when faced with the threat of resource loss, or with a lack of resource gain after the investment of resources (82-84). Resources are entities that have intrinsic or instrumental value and are found in the social contexts, including objects, conditions, personal resources, and energy resources (82-84). The COR theory assumes that there are two ways nurses might react when they encounter stressors in their environment and how those encounters can influence their well-being. The first assumption of the COR theory is a 'loss spiral'; here, people attempt to obtain, retain, and protect resources and stress occurs when they risk losing, or actually lose, such resources (82-84). For example, nurses who experience high levels of stress want to keep or regain their energy by reporting ill.

The second assumption of the COR theory is a 'gain spiral': here, resources can generate new resources. In the absence of stressors, people strive to obtain more resources. This activity creates buffers for more difficult times and increases well-being because additional resources are valued (85). Social support, assisting with home duties, or advice from their partner, may help nurses to overcome work problems and, subsequently, increase motivation and performance at work (86). They experience more physical and psychological resources allowing them to invest further in resources, rather than preventing the loss of resources (75, 86, 87). This process could lead to decreased sickness absence. However, the question remains as to whether resources related to sickness absence are mediated by well-being and/or motivation. Although the relationship between work-related external resources and well-being, motivation and sickness absence is well documented (88), few studies have examined how personal and home resources determine negative and positive consequences (81, 88, 89).

In the following sections, the work-related, home-related and personal resources are described, and are hypothesized as a possible solution to the labour participation problems of nurses together with a way in which this hypothesis can be tested.

Work-related external resources

Work-related resources, such as working time arrangements, are assumed to be important for nurses to increase their participation (90-92) and are considered particularly important when demands are high. Because work-related demands seem inevitable within nursing and are difficult to reduce on the short term (25), this thesis focuses on modifiable resources. Although the direct effects of work-related resources on sickness absence have been reported, they are assumed to predict sickness absence mediated by lower motivation and more health complaints (28, 30, 36, 93). In addition, work-related resources are assumed to have a direct positive effect on motivation and to buffer the effect of demands on health and sickness absence. Specifically, the effect of resources depends on the correspondence with the specific work-related demands (41, 42). Since the focus of this thesis is on nurses with shift work, two potentially important work-related external resources for nurses are: the social support of colleagues and supervisors, and (work schedule) control (94-98).

Home-related external resources

The home situation is not only perceived as a demand, but also as a resource for nurses to withstand the demands of the job. Being part of a family can prevent the development of health problems among nurses (85). According to the COR theory, this could allow them to invest further in resources, rather than preventing a loss of resources (75, 86, 87). For example, nurses with a socially supportive home (e.g. practical or emotional help from partner, friends, etc.) (99) or more autonomy at home (e.g. deciding when/how different care tasks are performed) seem better equipped to handle stressful circumstances and avoid problematic situations. Furthermore, home

resources can positively influence performance (86). Comparable to the mediated pathway of work-related external resources to sickness absence, it will be tested whether home resources negatively influence sickness absence via higher motivation and fewer health complaints (74).

Personal Resources

Because there is considerable variability in the extent to which nurses adapt to shift work (100), it is important to establish whether personal resources have an impact on participation, or mitigate the effect of demands on participation. Personal resources are aspects of the self (personal characteristics and skills) that are generally linked to resilience. They pertain to an individual's ability to successfully control and influence their environment, especially during challenging circumstances (101). Personal resources of a more practical behavioural nature are expected to moderate the negative consequences of work schedule demands (88, 89, 102-104). Accordingly, these personal factors (e.g. coping strategies or a healthy lifestyle) could determine or moderate the impact of work-related external factors on stress, subjective health, cardiovascular disease and burnout (26, 55, 89, 104-106). Specifically, active coping is a key personal resource in the COR theory, as it reflects aspects of the self that are generally linked to resilience (107). For example, employees with an active coping style are more likely to have fewer sickness absence episodes and of a shorter duration (108). Among nurses, an active coping style seems to protect against burnout (109-112) and also moderate the negative health effects of work-related demands on the dimensions of burnout (109, 112). In this thesis, it will be examined whether personal resources influence motivation and well-being, or moderate the impact of demands on motivation and well-being.

Potential of working time arrangements as a resource

Besides the detrimental effect of working time arrangements on participation, they can also provide opportunities to increase participation of nurses working in residential elder care. As mentioned, the varying working time arrangements are an important characteristic of nursing in residential elder care. Research on working time arrangements covers not only nightshifts and shift lengths, but also unsocial working hours (113). Unsocial working hours can cause problems in combining work and family life; in the Netherlands, such problems are particularly prevalent among a (mainly) female nursing population that has to combine work and care (76). The choice for the type of schedule is, to some extent, left to the preference of the nurses themselves and to their supervisors (92, 114). These choice options are expected to increase (48, 69) due to nursing shortages and the increasing numbers of freelance nurses (21, 115) and, in that case, these choice options create opportunities for nurses to work their preferred schedule. However, a change in working time arrangements is frequently imposed by the employer; in these circumstances, it threatens the resource (92, 116).

Female nurses might prefer or choose a certain type of work schedule as a way to enhance family life, fulfil childcare needs, and adapt to their partner's job and other social roles (117, 118). The advantages of non-standard working hours include: being able to spend more time with the children, bringing the children to school, and taking care of the family and/or parents (119). Furthermore, women with preschool-age children are more likely to report child care as their main reason for working shifts (120). In this way, in contrast to the chain of shift work possibly leading to social disruption and health problems, the schedule itself can be seen as a working time arrangement to withstand nursing demands, that keeps nurses motivated and might increase participation in terms of well-being, motivation and sickness absence. An indication of this work schedule preference (even a very demanding work schedule) as a resource was shown (for example) in the NEXT study; here, the prevalence of permanent nightshifts increased from 1.6% in the youngest group to 8.1% in the oldest group, and this type of schedule was appreciated by 80% of the nurses with regard to their private life (18). The same process may exist for employees with health problems. For example, Boot et al. (121) showed that, among chronically ill employees, working in the evening or night shifts significantly decreased sickness absence. Furthermore, De Raeve et al. (122) showed that employees adapt to mental health problems by reducing their working hours or by leaving shift work. These employees may have chosen the preferred type of work schedule that best fits their private or individual needs. Therefore, it is debatable whether the type of work schedule for nurses working in residential elder care is an important working time arrangement to increase health, motivation and participation.

Work schedule fit with private life as a resource

Therefore, it appears that an indicator and potentially important resource could be the work schedule fit with a nurse's private life, or fit with a nurse's individual needs. It is important how nurses perceive their work schedule with respect to their private life preferences (18, 52, 78, 90). Decisions and choices around scheduling are probably influenced by nurses' family considerations, especially for nurses with more extensive family responsibilities (123). According to Holtom et al., (124) employees will be more satisfied with a type of work schedule that fits their needs. Similarly, Nabe-Nielsen et al. (52) showed that a misfit between a preferred schedule and the actual schedule negatively affects work-related attitudes (52). Also, Krausz (90), and Sturman and Walsh (125), reported that the work schedule fit was even more important with respect to work-related attitudes than the actual work schedule. However, a limitation is that most of this latter research mainly concerned working hours, and not the type of work schedule. Furthermore, only misfit was measured, not taking into account the origin or the extent of the misfit. Therefore, for this thesis, a new instrument was required to measure work schedule fit with private life.

In conclusion, there are sufficient reasons to hypothesise that nurses' participation in terms of well-being, motivation and sickness absence might be enhanced by working the schedule

that best fits their family, personal and/or private needs. In view of the current variety of types of work schedules, it is important to elucidate which working time arrangements (e.g. the types of work schedule) are beneficial and which are detrimental to nurses' participation in terms of well-being, motivation and sickness absence. The nurses' perception of the work schedule fit with their private life could be a useful measure of this, and an essential resource to increase health, motivation and participation in spite of work, home and person-related demands and risk factors. It also meets the requirements that resources should correspond with the demands related to the work schedule (41). However, until now, nurses' perception of the work schedule fit with their private life is hardly reflected in research as a resource to withstand work-related demands and to enhance well-being and motivation. Therefore, it is important to test the role with respect to and in relationship with nurses' participation, besides the above-mentioned work-related, home-related and person-related demands and resources. Also, it is hypothesized that the effect of the work schedule fit with nurses' private life on sickness absence might be mediated by well-being or motivation. Moreover, the domain of personal factors is a topic still under discussion (126). For this thesis, incorporating resources into the extended ICF model has led to the conceptual model presented in Figure 2. In this thesis, in contrast with (for example) Heerkens et al. (3), motivation is considered to be an attitudinal work outcome and, in line with the COR theory, to be the outcome of personal and external factors and their interactions (127).

Figure 2: Conceptual, extended ICF model to study the work participation of nurses

To maintain quality of care at a high level, care organisations need to apply preventive measures to increase the participation of nurses in residential elder care. To clarify whether the work schedule, and the fit between the work schedule with private life, is a useful resource of nurses working in residential elder care (besides the personal, home and work-related external factors), it is necessary to examine the following:

1. How to measure the work schedule fit with nurses' private life,
2. Which type of work schedule nurses in residential elder care work in, and whether differences exist with respect to participation,
3. Which nurses work in what type of work schedules with respect to socio-demographic and family characteristics, and whether the perception of their fit of the work schedule with their private life differs,
4. Which nurses work in what type of work schedules with respect to well-being, motivation and sickness absence, and whether the type of work schedule is related to well-being, motivation and sickness absence,
5. Whether the work schedule fit with nurses' private life is a useful resource to enhance motivation and buffer the work-related external demands,
6. Whether nurses' work-related and home-related resources are useful to decrease sickness absence (besides home demands), and how they are related to sickness absence.

Setting

In this thesis, the target group is nurses working in residential elder care. This group has varying types of work schedules and high rates of health complaints and sickness absence. The present research focuses on nurses working shifts or irregular working hours in residential elder care. The homes for elder care participating in these studies accommodate clients with psycho-geriatric disorders and physical frailties. These particular organisations in the Netherlands were included because the nurses' work schedules are representative in that they reflect the diversity of work schedules of nurses working in both acute/short-term aged care as well as long-term aged care settings.

Although 'nurse' normally indicates the qualification level of a registered nurse, the current research uses this term for nurses working in residential elder care in the Netherlands. This includes registered nurses, enrolled nurses, licensed vocational or practical nurses, and nurse care helpers. In the Netherlands, although nurses working in residential elder care are comparable (with respect to qualification level) to nurses working in hospitals, home care, care for disabled people and mental health care, different psychosocial and physical demands are placed on them (128). The proportion of registered nurses working in residential elder care varies between European countries, with the Netherlands taking a lead in this respect (18).

Changes in Dutch Residential Elder Healthcare

The current healthcare system in the Netherlands has undergone changes since the start of this research project that are relevant when interpreting the findings of the studies presented in this thesis. Before, residential elder care was mainly financed by the Exceptional Medical Expenses Act (Algemene Wet Bijzondere Ziektekosten, AWBZ), but since 2015, the Social Support Act (Wet maatschappelijke ondersteuning, WMO), the Chronic Care Act (Wel Langdurige Zorg, WLZ), the Healthcare Insurance Act (Zorgverzekeringswet, ZVW) and the new Youth Act (Jeugdwet, JW) were introduced to replace this act. Elder care has since then mainly been funded by the new Long-term Care Act and the Social Support Act. Because of these changes, only high-level care is provided by nursing homes. Care for elderly with low-level care needs is no longer provided intramural, but at their homes. Care homes have largely disappeared and extramural care has been replaced by informal care and home care. The new Long-term Care Act (WLZ), includes all care tasks for people with a heavy, long-term care need, such as frail older people, and people with a severe or chronic disability. Consequently, residential elder care has become a highly complex and intensive process and better qualified personnel is needed. At the same time, nursing homes faces major challenges in the coming years due to nursing shortages (129-130). Consequently, job demands and job content have changed substantially.

Design

The work presented here made use of two datasets that together help investigate the aims of this thesis, i.e. a cross-sectional dataset, and a longitudinal dataset (from the 'Time for care; Care for time' study).

The first study, presented in **Chapter 2**, is based on the cross-sectional dataset of 140 nurses working in residential elder care. The studies in **Chapters 3 and 4** are based on the first wave of data from the longitudinal study entitled 'Time for care; care for Time' among a different nursing population of around 490 nurses working in residential elder care. The studies in **Chapter 5** (n=274 nurses) and **Chapter 6** (n=370 nurses) are based on the first and second wave of data obtained from the 'Time for care; care for Time' study. The study in Chapter 6 uses registered sick leave data one year after evaluations based on the first questionnaire.

Outline of this thesis

Chapter two presents a cross-sectional study focusing on the determinants of health, and on the development and validation of a new scale to measure 'the work schedule fit with private life' among nurses in residential elder care. This study tests whether the work schedule fit with private life mediates the relation between work and home characteristics on the one hand and health on the other.

In **Chapter 3**, using a larger dataset in a cross-sectional design, this study examines differences between nurses with respect to socio-demographic and family characteristics and perception of work schedule fit with their private life, to elucidate which nurses work in which type of work schedule. To achieve this, a new typology of work schedules is developed to assess the work schedules of nurses with shift work.

In **Chapter 4**, a dataset similar to that employed in Chapter 3 is used, but this study explores differences in participation in terms of well-being, motivation and sickness absence between nurses working in the different types of work schedules; an additional aim is to establish to what extent age might explain differences with respect to participation.

Chapter 5 investigates the role of personal and job resources. This study examines whether personal and job resources predict work engagement and emotional exhaustion, and whether interactions between personal resources/job resources and work schedule demands, predict work engagement and emotional exhaustion of nurses with shift work. This longitudinal study includes two waves of data collection, with a one-year follow-up, using self-report questionnaires among 247 nurses working shifts or irregular working hours in residential care for the elderly. Moderated structural equation modelling is conducted to analyse the interactions between personal and job resources, and work schedule demands.

Chapter 6 focuses on the effect of home demands/resources and job resources on sickness absence one year later, corrected for work-related external factors and the type of work schedule. In addition, it is examined how these variables are related and whether these relationships are mediated by health and motivation. Structural equation modelling analysis is performed on registered sick leave data to examine which characteristics predict registered sickness absence periods and duration one year later.

Finally, **Chapter 7** provides a general discussion of the research presented in this thesis.

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2

Nurses' satisfaction with shiftwork and associations with work, home and health characteristics: a survey in the netherlands.

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ABSTRACT

Aim: This paper is a report of a study conducted to determine if satisfaction with irregular working hours that are a form of shiftwork operates as a mediator between work and home characteristics and health problems.

Background: Shiftwork contributes to health problems, decreased well-being and poorer health habits. It also affects employees' decisions to leave the healthcare sector. Although many nurses voluntarily work shifts, there have been few studies of their satisfaction with irregular working hours when these are a form of shiftwork.

Methods: A survey was carried out with 144 nurses working in three nursing homes and one care home in the Netherlands. Questionnaires were distributed in 2003 to 233 nurses who worked shifts (response rate 60%). The questionnaire contained items on work and home characteristics, satisfaction with irregular working hours that are a form of shiftwork and health. A new scale to measure satisfaction with irregular working hours was constructed.

Results: All work characteristics, but no home characteristics, were associated with satisfaction with irregular working hours. The work characteristics "job demands" and the home characteristics "autonomy at home" and "home demands" were associated with health. Satisfaction with irregular working hours did not mediate between work/home characteristics and health. Those reporting more social support, lower job demands and more job autonomy were more satisfied with their irregular working times that were a form of shiftwork.

Conclusions: Satisfaction with irregular working hours is a useful construct that requires further longitudinal study. The results also underline the importance of considering home characteristics when predicting health outcomes.

INTRODUCTION

Research that offers insight into how nursing can become more attractive to the current nursing population and to new nursing students is imperative. Shortages of nurses will soon become a major problem in the Netherlands (1), as it already is around the world (2-4). These shortages are caused by the increasing demand for healthcare services because of 1) changing demographics, 2) longer life expectancy and 3) increases in the prevalence of chronic diseases. The shortage is exacerbated by high turnover and sickness absenteeism in the nursing profession.

The problem of nursing shortage is most prominent in residential elder care, such as nursing homes delivering intensive care and rehabilitative services and care homes providing meals and personal care. These have the highest sickness absenteeism levels in the Dutch healthcare sector (5). Additionally, shortages are expected to increase even further as a result of general decreases in the size of the labour force due to the outflow of older employees. About one in every four students leaving secondary school will have to work in the healthcare sector to compensate for this shortage, while at this moment the inflow of new students is decreasing (1). Nursing homes and care homes should thus focus on how to make the jobs more attractive, both to increase the inflow and to decrease turnover and sickness absence. An important way to do this is to improve nurses' health.

In this paper, we distinguish three factors that may cause problems regarding nursing health and thus require improvement: shiftwork, the specific job characteristics of nursing, and the combination of work and care duties. Nurses' shiftwork in the Netherlands is characterized by irregular working hours. We assume that nursing professionals will vary in their satisfaction with having these irregular working hours.

We assume also that job characteristics and the way in which working and caring is combined, affect their satisfaction with their shiftwork.

BACKGROUND

Shiftwork, job characteristics and combining working and caring.

The first factor that may negatively influence nurses' health is shiftwork. It is one of the profession's oldest problems and has been shown to contribute to influence the health of nurses (6-8) and to absenteeism (9, 10). Shiftwork causes stress to nurses and thereby influences their health, well-being and lifestyles (11). Furthermore, because of these effects, nurses working shifts also have been found to be at greater risk for disability than those working regular hours (12). With regard to the nurses' social habits, shiftwork can reduce social contacts and decrease involvement in various social organizations (13). Shiftwork is high on the list of factors that contribute to leaving the nursing profession (14, 15). Nevertheless, many nurses voluntarily do shiftwork. Some willingly

accept shiftwork and there are even some who appreciate it (16). Reported advantages of shiftwork include having a weekday off during a normal work week, being able to attend school activities, and having the flexibility that enables one to care for family and fulfil family responsibilities more easily (17). It is thus expected that whether one is satisfied with shiftwork will not only depend on the work situation but also on characteristics of the home situation.

Definitions of shiftwork differ (18). It is normally defined as working outside the normal daytime hours (19). Shiftwork among nurses in the Netherlands involves continuous, rotating systems in which nurses change from one shift to another, including nightshifts, and working in weekends and can be unpredictable (20). Furthermore, the speed and direction of rotation can differ and their weekly work hours can vary. This irregularity is assumed to have the most impact on wellbeing and satisfaction with shiftwork (21, 22). In line with the Dutch designation, in our study we defined this form of shiftwork as irregular working hours and the study therefore focuses on satisfaction with irregular working hours (SIW).

A second factor that affects nurses' reactions to their work is its specific job characteristics. Nursing is strenuous work, and occupational stress is prevalent among nurses. In fact, 30-40% of absenteeism has been estimated to be work-related (23). Additionally, about half of healthcare personnel indicated their long-term sickness absence to be work-related in a study by Van den Windt et al. (24). In 2006, 46% of the nurses working in nursing and care homes reported that job demands had a negative influence on their job performance (25). Furthermore, research has shown that low perceived job autonomy and high perceived job demands, in combination with insufficient social support, are related to stress and health problems among nurses (26).

A third factor that determines nurses' health is the combination of work and care duties. Scientific interest in this factor is recent due to the increased labour participation of women and changes that have blurred the boundaries between work and private life (27, 28). Researchers have become aware of the fact that nurses may experience stress not only because of their work, but also because of their home situation (29, 30). Many tasks and little social support (e.g. from their partner) at home have been found to be associated with health problems (31). However, at the same time, being part of a family also appears to play a role in preventing the development of health problems (32).

Research model

Given that this form of shiftwork, with irregular working hours, is not the only cause of health problems in nursing and it is impossible to abolish it, we must focus on determining the conditions at home and at work that can keep nurses relatively satisfied with irregular working hours and consequently keep them healthy. To date, research on the associations between work characteristics, home characteristics, SIW and health is limited. For this reason, we chose to focus on the mediating

role of nurses' SIW in the relationship between work and home characteristics on the one hand and nurses' health on the other hand.

Several theoretical frameworks relate work characteristics with psychological and physical outcome variables. One of the most influential models is the Job Demand–Control Support (JDACS) model (33, 34). In our context, it is important to use a validated model to make explicit the role of a new concept. According to this model, if the perceived demands at work are relatively low and there is sufficient autonomy and social support, positive health outcomes can be expected.

In our model, we included demands, autonomy and social support at home (35). We further hypothesized that nurses who evaluated their SIW relatively positively would also report better health than those who considered their shiftwork to be taxing. This is in line with findings by Krausz et al. (36). Furthermore, SIW was assumed to mediate the relationship between work and home characteristics on the one hand, and health on the other. This reasoning corresponds with a vast amount of research on job stress, job-related attitudes and health (37-39). In most of these stress theories, the stress process is seen as a causal chain of stress and strain. First, objective stressors will influence subjective stressors. Second, these stressors will influence job satisfaction and subsequently psychological and physical health (40). Thus, it can be expected that satisfaction with certain aspect of the job mediates the relationship between stressors and health. Our model is presented in Figure 1.

THE STUDY

Aim

The aim of the study was to determine if satisfaction with irregular working hours that are a form of shiftwork operates as a mediator between work and home characteristics and health problems. We posed the following research questions:

1. What are the relationships between work and home characteristics with satisfaction with irregular working hours?
2. What are the relationships between work and home characteristics with health?
3. What is the relationship between satisfaction with irregular working hours with health?
4. Does satisfaction with irregular working hours act as a mediator between work and home characteristics on the one hand and health on the other?

In Figure 1, the relationships that are referred to in the research questions are numbered.

Figure 1: The research model

Design

The study had a cross-sectional survey design and data were collected in 2003.

Participants

The study involved all nurses working shifts in one care home and three nursing homes in the Netherlands. These four homes accommodate a combination of approximately 350 psychogeriatric and physically frail clients and belong to the same organisation for elder care.

All nurses working shifts and who had been employed in their organisation for at least three months were asked to participate in the study. This latter criterion was included as it was thought that employees working less than three months at an institution might not yet be totally familiar with their new work situation and therefore unable to convey their SIW. Of all nurses that met the inclusion criteria (N=233), 140 returned the questionnaire (response rate of 60%).

Data collection

Data were collected using a questionnaire assessing demographic variables, work characteristics, home characteristics, SIW and health variables. They were asked to return the questionnaire within two weeks. Two weeks after the initial distribution of the questionnaires, a reminder letter was sent to all participants.

Measures

Demographic variables included age, work location, educational level as distinguished by 5 levels (care assistant level 1, care helper level 2, care worker level 3, nurse level 4 implying a degree at vocational education level, nurse level 5 implying a bachelor degree at an university of applied sciences), work history and taking care of children (yes or no).

Work characteristics were selected from the JDCS model (33). Job demands were measured using an eight-item scale (41) with a 5-point response scale that ranges from 'never' to 'always'. The

scale contains a range of quantitative and qualitative items concerning the work situation. (Item example: 'In the organization where I work, too much work has to be done'). Internal consistency estimated by Cronbach's α is 0.90. Job autonomy refers to the worker's ability and opportunities to determine a various task elements, such as the method of working, the pace of work and the work goals. This was assessed with the Maastricht Autonomy Questionnaire (MAQ; 41), a 10- item scale with a 5-point response scale ranging from 'very little' to 'very much'(Item example: 'My work allows me to determine my own working method') (Cronbach's α = 0.86). Social support refers to the worker's perceived social support from supervisors and colleagues. This was measured using a 10-item scale derived from a Dutch questionnaire for organisational stress (VOS-D; 42). This scale uses a 4-point response scale that ranges from 'never' to 'always' (Item example: 'If you have problems at work, can you discuss them with your colleagues?') (Cronbach's α = 0.82).

Home Characteristics were operationalised similarly to the operationalisation of work characteristics (35). Home demands were measured using a 7-item scale with a 5-point response scale ranging from 'once a month' to 'seven times a week' (35). This scale measures quantitative demands at home (Item example: 'How many times a week do you usually have to clean the house?') (Cronbach's = 0.87). Autonomy at home was measured with only one item ('Is it possible to find someone to take over work and home tasks when you cannot manage? This scale uses a 4-point response scale that ranges from 'never' to 'always' (35). Social support at home was measured with two items ('How often does your partner, family or friends pay attention to your feelings and problems regarding your work?' and 'How often does your partner, family or friends pay attention to your job?'). This scale has a 4-point response scale that ranges from 'never' to 'always' (35) (Cronbach's α = 0.74).

Development of Satisfaction with Irregular Working Hours (SIW) scale

SIW was measured using a newly-developed scale (see appendix 1). As earlier described, irregularity is emphasized because this matches the type of shiftwork in our population. SIW refers to the extent to which nurses are satisfied with their irregular work schedules, particularly in the context of their leisure time, family situation, social circumstances, sleep and work-leisure time balance (6, 11, 43). We developed the scale as follows (44):

1. We first conducted a literature review to detect relevant domains in working shifts.
2. We conducted semi-structured interviews (N= 5) with nurses who work shifts to identify categories of problems related to working shifts.
3. Based on the results of step 1 and step 2 a scale was developed, consisting of 15 items.
4. To improve face and content validity, the scale was evaluated for relevance, clarity and readability of the items by a panel of four experts with experience of scale development and with nurses who worked shifts. Content validity of the scale was regarded as satisfactory by both experts and nurses.
5. Based on the results of step 4, the scale was adjusted and shortened to 13 items. A 5-point response scale ranging from 1 'entirely dissatisfied' to 5 'entirely satisfied' was used.

6. In the final step, to investigate the psychometric properties reliability and factor analyses were conducted. Internal consistency estimated by Cronbach's α in this study was 0.89, and the average inter-item correlations was 0.39. Explorative factor analysis using an eigenvalue greater than 1.0 as the criterion showed a 2-factor structure explaining 54% of the total variance. However, one item scaled on both factors. The separate factor did not reflect clearly different concepts. The scale as a total had a high internal reliability. We therefore considered the *SIW* scale to be one-dimensional.

Health variables were measured using three scales. First, psychosomatic health complaints were measured with a 13-item version of a Dutch perceived health questionnaire (VOEG (Vragenlijst Onderzoek Ervaren Gezondheid [Perceived Health Questionnaire]) developed by Dirken (45). The VOEG contains items that ask if the respondent suffers from a range of psychosomatic complaints, such as headaches and backache. Each item is scored with either 'yes' or 'no'. A higher sum score reflects the presence of more psychosomatic complaints. Internal consistency estimated by Cronbach's α is 0.75-0.93.

General fatigue was measured with the Multidimensional Fatigue Inventory (MFI)(46). This scale contains four items that are scored on a 5-point scale ranging from 'yes, that is true' to 'no, that is not true' (Item example: 'I feel very tired'). Internal consistency estimated by Cronbach's α = 0.86.

Emotional exhaustion was measured using the Dutch version of the Maslach Burnout Inventory (47). This instrument is particularly suitable for use in human services professions like nursing. Moreover, emotional exhaustion is the most characteristic burnout dimension. The Maslach Scale contains five items that are scored on a 7-point response scale from 'never' to 'always' (Item example: 'Working all day is really a strain for me'). Internal consistency estimated by Cronbach's α = 0.74-0.88.

Ethical considerations

The study was approved by the management of the organisation involved. The research procedure was communicated to the nurses through an institutional newsletter and an individual letter. Return of a completed questionnaire was taken to imply consent.

Data analysis

Data were analysed using the Statistical Package for Social Science (SPSS) version 12.0. Descriptive statistics were computed for all variables. The internal consistency of the scale was determined by Cronbach's alpha reliabilities. Inferential statistics were used to address the research questions. Scales were created by averaging the items. To investigate the relationships between work characteristics, home characteristics, *SIW* and health, multiple regression analyses were performed. Variables to be controlled for were age, educational level, work location, work history and childcare. In these analyses, the level of statistical significance was set at $p < .05$. The variance, the change in variance and standardized beta's were computed.

To determine whether *SIW* acts as a mediator in the relationships between work and home characteristics on the one hand and health on the other, multiple regression analyses were performed. It is important to note that, in order to establish mediation, the following four conditions have to be met (48, 49):

1. Work and home characteristics must be associated with the health variables. Regression analyses were therefore performed with health variables as the dependent variables and work and home characteristics as independent variables. In these analyses, we corrected for the potential confounding variables (for age, educational level, work location, work history and childcare).
2. Work and home characteristics must be associated with *SIW*. We therefore performed regression analyses with *SIW* as the dependent variable and work and home characteristics as independent variables. Here too, we corrected for the potential confounding variables.
3. *SIW* must be associated with health. To answer the third research question, regression analyses were performed with all health variables as dependent variables and *SIW* as the independent variable corrected only for the confounding variables. Subsequently, hierarchical regression analyses were applied on all health variables with first entering background variables and *SIW* and secondly entering work and home characteristics. Again, we corrected for the confounding variables.
4. If all these three conditions are met there is a possible mediation effect. To see if there is a partially or a complete mediation effect of *SIW*, we had to determine whether or not the associations between work and home characteristics and the health variables (partially or completely) disappear when entering *SIW*. Steps 3 and 4 are estimated in the same equation.

RESULTS

Respondent demographics

Table 1: Respondent demographics (N=140)

Descriptive		Values	
Women		133	(95%)
Working in nursing home		120	(86%)
15-25 years		21	(15%)
26-35 years		35	(25%)
36-45 years		40	(28.5%)
46-55 years		40	(28.5%)
56-65 years		4	(3%)
Average working history as nurse; (Min-Max; SD)	Mean	11.4	(0.5-36.0; 8.9)
Average hours worked per week; (Min-Max; SD)	Mean	26.2	(9.0-38.0; 7.1)
Level 1		4	(3%)
Level 2		20	(14%)
Level 3		98	(70%)
Level 4		14	(10%)
Level 5		4	(3%)
Taking care of child		94	(67%)
Kind of irregular working hours			
o Nightshift		6	(4%)
o Evening shift		6	(4%)
o Morning / Evening shift		50	(36%)
o Morning / Night shift		1	(1%)
o Evening / Night shift		3	(2%)
o Morning / Evening/ Night shift		74	(53%)

The demographics of the nurses can be seen in Table 1. The majority of participants were females (133, 95%), worked in a nursing home (120, 86%) and were aged 35 years or older (84, 60%). The majority (74, 53%) worked all different shifts (a combination of morning, late and night shifts), while others worked a combination of early and late shifts (50, 36%). The mode educational level was level 3, which is comparable with the level of a care worker (50).

The means, standard deviations and reliabilities for the variables studied are presented in Table 2. Some values from Table 2 are worth noting. For all scales, Cronbach's alpha reliabilities were greater than 0.70, which is considered acceptable (51). The respondents scored just above the mean on the new SIW scale (M=3.64; 1-5). They were also of approximately the same age and level of education as the average Dutch level of nurses working in nursing homes and care homes (52).

Table 2: Means, standard deviations and Cronbach's alphas

	Variable	Theoretical Range	Direction	Mean	SD	Cronbach's α
Work characteristics	Job demands	1-5	Higher values indicate more job demands	2.86	.68	0.90
	Autonomy	1-5	Higher values indicate more autonomy	2.88	.55	0.82
	Social support	1-4	Higher values indicate more social support	3.30	.34	0.81
Home characteristics	Home demands	1-5	Higher values indicate more home demands	3.37	.67	0.82
	Autonomy at home	1-4	Higher values indicate more autonomy at home	1.70	.94	na
	Social support at home	1-4	Higher values indicate more social support at home	1.94	.69	0.71
SIW	Satisfaction with irregular working hours	1-5	Higher values indicate more satisfaction with irregular working hours	3.64	.49	0.89
Health	Health complaints	0-13	Higher values indicate more health complaints	2.99	2.62	0.76
	Emotional exhaustion	0-6	Higher values indicate more emotional exhaustion	1.61	.97	0.86
	General fatigue	1-5	Higher values indicate more general fatigue	2.43	1.08	0.87

Regression analyses

To examine the relationships between work and home characteristics on the one hand and SIW and health on the other, multiple regression analyses were performed. The results are presented in Table 3. The regression analyses demonstrated that, for SIW, social support from colleagues and supervisors, job demands and autonomy at work accounted for 24% of the variance. For health complaints, job demands accounted for 12% of the variance. For emotional exhaustion, job demands,

educational level and autonomy at home explained 20% of the variance. Lastly, for general fatigue, job demands, age and demands at home explained 25% of the variance. In all of the above, the variables explaining the variance were presented in order of importance.

As stated earlier, certain conditions have to be met prior to investigating the potential mediating role of SIW in the relationship between work and home characteristics on the one hand and health variables on the other hand. The results reported above show that only the variable job demands fulfilled the first two conditions, namely being related to both the health variables and SIW (see Table 3). To test the third and fourth condition, regression analyses were conducted for all health variables with SIW and the work and home characteristics as the independent variable, and correcting for potential confounders.

Table 3: Multiple regressions of health and Satisfaction with Irregular Working Hours (SIW) on work and home characteristics, controlling for background variables.

Variables n=140		SIW	Health complaints	Emotional exhaustion	General fatigue
		B	B	B	B
ΔR² Step 1		12% p=.005	4% p=.311	14% p=.001	15% p=.000
Background variables	Age	.05	-.11	-.12	-.38***
	Educational level	-.02	-.02	.20*	.00
	Work location	.14	.15	-.07	.07
	Working history	-.06	.04	-.05	.10
	Taking care of children	.07	.06	-.10	-.04
ΔR² Step 2		18% p=.000	15% p=.001	12% p=.003	15% p=.000
Work characteristics	Job demands	-.19*	.39***	.25**	.38***
	Autonomy	.16*	.00	-.15	.04
	Social support	.27**	-.10	-.09	-.08
Home characteristics	Home demands	-.06	.09	.11	.19*
	Autonomy at home	.09	-.08	-.17*	-.04
	Social support at home	.08	-.02	.01	-.09
R² total		30% p=.000	19% p=.003	26% p=.000	31% p=.000
Adjusted R² total		24%	12%	20%	25%

*p<.05, **p<.01, ***p<.001
Work location: nursery home=0, care home=1
Care of children: no=0, yes=1
B= is the standardised regression coefficient.
The B values shown are the coefficients from the final stage of the regression analysis, the second step.
ΔR² is the change in variance (in %) associated with adding each block sequentially into the regression equation.
R² total refers to the variance (in %) explained by all selected variables.

Table 4: Multiple regressions of health on Satisfaction with Irregular Working Hours (SIW), controlling for background variables.

Variables n=140		Health complaints	Emotional exhaustion	General fatigue
		B	B	B
ΔR² Step 1		4% p=.311	14% p=.001	15% p=.000
Background variables	Age	-.13	-.12	-.38***
	Educational level	-.06	.17*	-.05
	Work location	.00	-.17	-.08
	Working history	.02	-.07	.10
	Taking care of children	.17	-.01	.12
ΔR² Step 2		3% p=.032	4% p=.006	2% p=.127
SIW	Satisfaction with irregular working hours	-.19*	-.24**	-.13
R² total		8% p=.102	18% p=.000	17% p=.000
Adjusted R² total		3%	15%	13%

*p<.05, **p<.01, ***p<.001
Work location: nursery home=0, care home=1
Care of children: no=0, yes=1
B= is the standardised regression coefficient.
The B values shown are the coefficients from the final stage of the regression analysis, the second step.
ΔR² is the change in variance (in %) associated with adding each block sequentially into the regression equation.
R² total refers to the variance (in %) explained by all selected variables.

As shown in Table 4, SIW was associated with health complaints and emotional exhaustion, but not with general fatigue when controlling for background characteristics. However, after controlling for work characteristics and home characteristics in addition to background characteristics, we found no association between SIW and health complaints, emotional exhaustion or general fatigue (Table 5), Furthermore, the associations between job demands and the health variables did not (partially or completely) disappear.

Table 5: Multiple regressions of health on Satisfaction with Irregular Working Hours (SIW), controlling for background variables, home and work characteristics.

Variables n=140		Health complaints		Emotional exhaustion		General fatigue	
		B		B		B	
ΔR² Step 1		4%	p=.311	14%	p=.001	15%	p=.000
Background variables	Age		-.10		-.12		-.38***
	Educational level		.02		.20*		.00
	Work location		.15		-.05		.07
	Working history		.03		-.06		.10
	Taking care of children		.06		-.09		-.04
ΔR² Step 2		3%	p=.032	5%	p=.006	2%	p=.127
SIW	Satisfaction with irregular working hours		-.06		-.11		.00
ΔR² Step 3		12%	p=.007	8%	p=.029	14%	p=.001
Work characteristics	Job demands		.38***		.23*		.38***
	Autonomy		.01		-.13		.04
	Social support		-.09		-.06		-.08
Home characteristics	Home demands		.08		.10		.19*
	Autonomy at home		-.07		-.16		-.04
	Social support at home		-.02		.02		-.09
R² total		19%	p=.005	27%	p=.000	31%	p=.000
Adjusted R² total		12%		20%		24%	

*p<.05, **p<.01, ***p<.001
Work location: nursery home=0, care home=1
Care of children: no=0, yes=1
B= is the standardised regression coefficient.
The B values shown are the coefficients from the final stage of the regression analysis, the third step.
ΔR² is the change in variance (in %) associated with adding each block sequentially into the regression equation
R² total refers to the variance (in %) explained by all selected variables in the blocks

In summary, referring to Figure 1, health variables were explained by work as well as home characteristics (arrow 2), while SIW was only explained by work characteristics (arrow 1). SIW was found to be associated with health variables (arrow 3). Lastly, we did not find evidence that SIW mediates the relationships between work characteristics on the one hand and health on the other hand (arrow 4).

DISCUSSION

This research brought additional answers to questions about how the employees' working and home situations affect their satisfaction with irregular working hours (SIW) that are a form of shiftwork and their health.

Study limitations

The findings of this study should be interpreted in the context of a few limitations. First, because the study was cross-sectional, we cannot conclude that causal relationships exist between the variables. As a result, the role of SIW remains somewhat unclear.

Second, although our SIW scale clearly refers to social and practical consequences of shiftwork and has high reliability, in future work we may consider including an item about satisfaction with the extra payment for working shifts. Although, earlier research (53) showed that the focus of nurses was directed to the social and health-related aspects of their working hours, recent work has shown a positive relationship between rewards and job satisfaction (54).

Third, the relatively small sample size (n=140), and the fact that all respondents had the same employer, reduced the external validity of our study. Nonetheless, our sample was comparable in age and level of education to the general nursing population working in nursing and care homes in the Netherlands.

Finally, because the questionnaires used to measure work and home characteristics and outcome variables were self-reported, common method variance may have occurred: a common problem which plagues most questionnaire-based research (55, 56). Future researchers can avoid this potential source of confounding by collecting data from additional sources.

Discussion of results

Our assumptions based on the JDCS model (33) were confirmed for SIW but home characteristics were not associated with SIW. This contradicts the assumption of some models that claim that attitudes towards working hours are influenced by both the work and the home situation (57). However, it is possible that nurses who, because of their work schedules, are less socially integrated, focus more on their work situation than on their home situation when experiencing stress. This seems to be especially applicable to social support at work (58), which in our study demonstrated the strongest association with SIW.

Our results also showed that job demands contribute statistically significantly to nurses' health problems (59). Those who experienced many demands at home also reported more general fatigue. De Rijk et al. (60) also found that having many demands (at home as well as at work) was a strong predictor for general fatigue. In addition, our nurses who reported more autonomy at home experienced less emotional exhaustion. Perhaps the availability of more resources in one domain (in

this case, the home) acts as a resource for adapting to demands in a different domain (in this case, at work). This suggests that home and work domains should not be viewed as mutually- exclusive domains. This is in line with the conservation of resources theory (61).

Social support was found to be related to a specific attitude towards the job, namely SIW. Similarly, in the work of Bradley and Cartwright (62) and Gelsema et al. (63), social support predicted job satisfaction only, and not health complaints.

Nurses who were more satisfied with their irregular working hours experienced fewer health complaints and less emotional exhaustion. Fatigue is apparently not related to the way employees feel about their schedule and the psychological meaning of their work schedules. Shiftwork is related to fatigue (64). Our findings mean that the key in preventing emotional exhaustion and psychosomatic health complaints is keeping nurses satisfied with their irregular working hours.

Older nurses experienced less general fatigue than younger nurses, but age differences were not found for the other health variables. It is possible that this association is due to the healthy worker effect (65). This effect is a form of self-selection; employees who were unable to do shiftwork due to various health problems already stopped working shifts. Since fatigue has been found to be an important factor in determining whether to stop working shifts (22), the healthy worker effect is a feasible explanation. However, it is also possible that younger nurses experience more stress and fatigue due to higher family responsibilities compared to older nurses, although the latter may care for older relatives.

SIW did not mediate the relationships between the work and home characteristics on the one hand and health on the other. It is possible that dissatisfaction with work schedules generates more negative perceptions of the work situation, which in turn yield more health problems. If so, work characteristics (e.g. job demands) would be the mediating factor. It is also possible that SIW interacts with work and home characteristics. For example, when nurses are dissatisfied with their work schedules, they may be less able to cope with job demands and therefore experience more stress.

CONCLUSION

Shiftwork will always be required in nursing and care homes worldwide, and therefore it is necessary to take some measures to alleviate the potential stress resulting from this.

Job demands are by far the most important factor in relation to decreased health outcomes. Employers should consider the distribution of job demands, with a view to ensuring the best match between the demands and employee. In addition, supervisors should consider their employees' situation at home (both demands and autonomy) when supporting them. Because shiftwork in nursing is inevitable, nurses' satisfaction with their working hours should be promoted, for example giving them more control over their schedules. They should also be taught how to take advantage of working irregular hours, which are a form of shiftwork that may prevent them from emotional

exhaustion and health complaints. Decreasing the outflow of young healthcare personnel in particular is imperative and consistent with other research; our findings regarding fatigue levels suggested that particularly younger nurses need attention. Regular health assessments could help to detect health problems at an early stage especially for employees who are dissatisfied with their irregular working hours, a form of shiftwork.

With regard to further research, the SIW scale should be further validated. Reliability scores for the scales used were adequate, but the scale measuring autonomy at home was a one-item scale. We recommend expanding this scale to include other items, such as the degree to which one can participate in the allocation of tasks at home.

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APPENDIX 1: THE SATISFACTION WITH IRREGULAR WORKING HOURS SCALE

Item number	
1	In general, how satisfied are you with working irregular hours?
2	How satisfied are you with the amount of time you are able to spend with your family and friends outside of work?
3	How satisfied are you with the amount of time you are able to spend on your leisure activities and hobbies (sports, club, going out with others)?
4	How satisfied are you with the quality of your sleep given your irregular working hours?
5	How satisfied are you with the fact that you often have to work on the weekends?
6	How satisfied are you with the fact that you can go shopping on week days (clothing, presents and others) because of your irregular working hours?
7	How satisfied are you with the fact that you can take care of certain things (car reparation, cleaning the house, and seeing others) because you work irregular hours?
8	How satisfied are you with the fact that you sometimes have to work during holidays due to your irregular working hours?
9	How satisfied are you with the quality of your eating habits given your irregular working hours?
10	How satisfied are you with the combination of irregular work – leisure time?
11	How satisfied are you with the variation in work given your irregular working hours?
12	How satisfied are you with the quality of your contact with family, friends and spouse given your irregular working hours?
13	How satisfied are you in general with the scheduling of your irregular working hours?

A new typology of work schedules: evidence from a cross-sectional study among nurses working in residential elder care.

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ABSTRACT

Background: Work Schedules Contribute Substantially To The Health And Well-Being Of Nurses. Too Broad Typologies Are Used In Research That Do Not Meet The Current Variety In Work Schedules.

Objective: To Develop A New Typology For Nurses' Work Schedules Based On Five Requirements And To Validate The Typology.

Methods: This Study Is Based On A Questionnaire Returned By 498 Nurses (Response 51%) Including Questions Regarding Nurses' Work Schedule, Socio-Demographic, And Family Characteristics And Their Appraisal Of The Work Schedule. Frequencies Of The Different Schedules Were Computed To Determine The Typology. To Validate The Typology, Differences Between The Types Were Tested With Anovas, Chi² And Kruskal-Wallis Tests.

Results: Five Main Types Can Be Distinguished Based On Predetermined Requirements And Frequencies, Namely: (1) Fixed Early Shift, (2) Rotating Two Shift Pattern Without Night Shift, (3) Rotating Three Shift Pattern, (4) Fixed And Rotating Two Shift Pattern Including Night Shift, And (5) Fixed Normal Day Or Afternoon Shifts. Nurses In These Types Of Work Schedule Differed Significantly With Respect To Hours Worked, Days Off Between Shifts, Age, Education, Years In The Job, Commuting Time, Contribution To Household Income, Satisfaction With Work Schedule And Work Schedule Control. Especially Nurses With Type 3 Schedules Differed From Other Types.

Conclusions: A Typology Of Five Main Types Of Working Schedules Is Proposed. Content Validity Of The Typology Is Sufficient And The New Typology Seems Useful For Research On Work-Related Aspects Of Nursing.

INTRODUCTION

Shiftwork is high on the list of factors that contribute to leaving health care and decreasing quality of care in the Netherlands and globally as well (1-4). In research, shiftwork is often broadly defined as working outside the normal daytime hours (5-7). Research on shiftwork is hampered by broad and indistinct operationalizations of work schedules (6, 8) which do not meet the current variety of work schedules. Merkus et al. (6) showed in their extensive systematic review that especially in health care, the influence of shiftwork on outcomes might be schedule and population (female) specific. Even high quality studies used in their review did not specify or differentiate between work schedule characteristics. It is difficult to interpret and compare research on work schedules because of the lack of detailed information (6). It thus seems important to develop a typology of work schedules that meets the above-mentioned problems.

Although 'nurse' indicates normally the qualification level of a registered nurse, the current research uses this term for nurses working in residential elder care in the Netherlands. This includes registered nurses, enrolled nurses, licensed vocational or practical nurses and nurse care helpers. In the Netherlands nurses working in residential elder care are comparable with respect of qualification level to Dutch nurses working in hospitals, home care, care for disabled people and mental health care but do have different psychosocial and physical demands (9). The proportion in Europe of registered nurses, enrolled nurses, licensed vocational or practical nurses is the highest in hospital care followed by residential elder (10). The proportion of registered nurses working in residential elder care varies between European countries with the Netherlands as a leading country (11).

Nurses are among the workers who work in different work schedules. Work schedules are changing (2, 12) and the work schedule a nurse works in usually changes during her career. Although irregular working hours are mandatory, the choice for the type of schedule is, to some extent, up to the nurses themselves and to their supervisors (13). Choice options are expected to increase (3, 12) due to nursing shortages and increasing numbers of freelance nurses. This leads to an increasing variety of types of work schedules (2, 3, 14). The variety of work schedules is probably greater now than it has ever been (15).

There seems to be no scientific agreement on what the best work schedule typology is (7, 8, 16). Therefore, the influence of specific work schedules can not be fully studied and research that focuses on, for example, the effects of shiftwork on well-being and employability will consequently be hampered.

Background

A meaningful typology for the large diversity in contemporary work schedules should reflect the degree to which a schedule disturbs the biological rhythm, sleep, family life and social life (17). Evidence seems to be indicating (18, 19) that it is important for research to distinguish between

different types of fixed and rotational shifts, in order to detect differences between the types of schedules besides the usual distinction between fixed and rotational work schedules. Often the two shift and three shift are combined. Other research showed significant differences between these shift schedules with respect to stress, health and job related attitudes, in disadvantage of the three shift schedule (20-22). Moreover, reviews on shiftwork show that nurses working in fixed shifts show fewer problems with respect to health and social and domestic problems than nurses working in rotating shifts (23, 24).

Especially for a dominantly female working population which most of the time has to combine work with duties at home (25, 26), sleep quality seems of great importance (27, 28). Night and early shifts affect, among other things, quality of sleep. Also the number of hours of night sleep before the early morning shifts and hours of day sleep after night shifts seems to be disturbed, which diminishes the possibility to recover (29-33). Nurses with fixed schedules without nightshifts might be better able to combine work and care at home than nurses with a combination of rotating shifts. Early and evening shifts seem to cause conflict with other social and family activities, e.g. school timetables of children. Commuting time to work can interrupt sleep before going to an early shift (8, 33-36).

When defining the new types, the following requirements thus have to be met:

1. a distinction has to be made between fixed shift pattern versus rotating shifts (19);
 2. a distinction has to be made between nightshifts versus no nightshift (18, 37); and
 3. a distinction has to be made between early shifts versus day shift because of the combination with commuting time, which could affect sleep (25, 30).
- Furthermore, for research purposes the typology has to be concise but also has to cover the variety of work schedules. Therefore, the following criteria have also to be considered:
4. it has to represent the most prevalent types of work schedules in separate types; and
 5. it has to classify not more than five types of schedules, in order to use the new typology in statistical analyses.

In addition, work schedule characteristics and nurse characteristics should differ across the types of work schedule according to the new typology to show sufficient construct validity. It can be expected that the work schedule types differ regarding work schedule characteristics, such as working part-time, working overtime and having days off (16, 38-40). Further, the nurses working in the different types might differ regarding socio-demographic characteristics and family characteristics (3, 14, 41), but also regarding their appraisal, in terms of satisfaction with work schedule (42) and work schedule control.

Differences between the work schedule types can also be expected in the way the nurses appraise their work schedule. Employees will be more satisfied when they work the type of work schedule that fit their needs (43, 44). Female nurses might prefer non-standard working hours as a conscious choice to arrange work around childcare and their partners' job (45, 46). Decisions

and choices around scheduling are influenced by family considerations and most often not by their own health and well-being, especially for workers with more extensive family responsibilities (26). Other studies show that the appraisal of the work schedule adds to the explanation of outcomes. Authors argue that employees' appraisals of 'objective' conditions (47), such as the work schedule, need to be included to fully take work schedules into consideration (48, 49). Peters et al. (42) found satisfaction with the work schedule (measured with the SIW scale), for example, to be strongly linked to health characteristics. Van Rijswijk (50) found that female employees, who work the schedule that fitted with their other responsibilities, experienced less work-home interference, in addition to objective characteristics such as the number of work hours and flextime. Furthermore, perceived control over work time has been a major concern in recent research and seems to be an independent predictor of health, job attitudes and work-life conflict for women in particular (51, 52).

Objectives

The objectives of this study are to define a contemporary typology of work schedules in nursing and to study differences between these types in terms of work schedule characteristics, socio-demographic characteristics, family characteristics, and the nurses' appraisal of the work schedule. The research questions are therefore as follow:

1. What is a useful typology of nowadays work schedules among nursing populations for both research and management purposes?
2. What are the work schedule characteristics of the types and what are the differences?
3. a) What are the nurses' socio-demographic and family characteristics and what is the appraisal of the work schedule by nurses in the different types of work schedule and,
b) What are these differences between nurses in the different types of work schedule?

METHODS

Design

A cross-sectional study was performed to answer the research questions. With the questionnaire, information was gathered in October 2009 regarding work schedule descriptives and characteristics, socio-demographic and family characteristics and the appraisal of the work schedule. The questionnaire was sent to the home addresses of all nursing employees working shifts in three residential elder care facilities in the Netherlands. Nurses were asked to return the questionnaires within two weeks. Reminder letters were sent to all participants two and three weeks after the initial distribution of the questionnaires.

Sample

The study involved nurses working shifts in three residential elder care facilities in the Netherlands. The educational level of these nurses can be distinguished by five levels: level one, two and three refer to care helper providing basic care. Level four nurse implies secondary vocational education and is comparable with an enrolled nurse, licensed vocational or practical nurse, and level five implies higher vocational education with a bachelor degree and is comparable with a registered nurse (RN). The three homes for elder care that participated accommodate clients with psycho-geriatric disorders and physical frailties. The organizations were included because the nurses' work schedules were representative because they seem to reflect the diversity of work schedules of nurses working in both acute or short-term aged care and long-term aged care settings in the Netherlands.

Inclusion criteria

Nurses were only included if they reported their type of work schedule and worked with - mostly - elderly clients with psycho-geriatric disorders and physical frailties. Of all nurses invited in this study (N=1009), 974 met the inclusion criteria. Of these 974 nurses, 498 returned the questionnaire (response rate of 51%). Exclusion criteria were being on sick leave for over twelve months and being younger than 18 years or older than 65 years of age.

Measures

The questionnaire assessed work schedule descriptives and characteristics, socio-demographic and family characteristics and the appraisal of the work schedule.

Work schedule descriptives

To collect data on the descriptives of the work schedules needed for developing the new typology, respondents were asked when their working days began and ended and which shifts they worked (morning, afternoon and night shifts). They were also asked whether they worked other shifts besides the standard morning, late and night shifts. Early shifts (start of work day between 6.00 a.m. and 7.30 a.m. and ending before 3.30 p.m.), 'normal' day shifts (start of work day between 7.00 – 8.00 and ending between 4.00 – 5.00 p.m.), late shifts (start of work day between 3.00 – 5.00 p.m. and ending between 8.00 – 11.00 p.m.) and night shifts (start of work day between 11.00 p.m. and ending around 7.00 a.m.). By asking when their shifts started and ended instead of using only predefined shift categories, we tried to prevent for misclassification of type of shift.

Work schedule characteristics

To test differences between work schedule types, the following work schedule characteristics were measured.

Average number of hours each week and average number of overtime hours each week were included in the questionnaire. *Days off between two series of shifts* was used to measure the ability to recover or take rest using a single item concerning the number of days off between two series of shifts. *Prior knowledge of work schedule* was operationalized by asking participants how many weeks in advance they were informed of their work schedules on a ordinal scale ranging from 1 'one week' to 5 'more than four weeks'. This was dichotomized into 0 'knowledge of schedule at least 2 weeks in advance' or 1 'less than two weeks in advance', because two weeks is mandatory according to the collective labour agreement.

Socio-demographics and family characteristics

Data regarding socio-demographic and family factors include sex, age, educational level, job status, marital status, partner's job status, partner's shiftwork, partner's average number of working hours per week, number of children < 12 years, number of days children spent in day care per week, number of hours spent on care for family members per week, commuting time per workday and contribution to the total household income.

Appraisal of the work schedules

Satisfaction with work schedules was measured using the Satisfaction with Irregular Working times (SIW) scale (42). SIW refers to the extent to which nurses are satisfied with their irregular work schedules, particularly in the context of their leisure time, family situation, social circumstances, sleep and work-leisure time balance. The scale consists of fourteen items that are scored on a 5-point response scale ranging from 1 'entirely dissatisfied' to 5 'entirely satisfied'.

Work schedule control was measured by 10 items. This scale measures the perceptions of having a choice in and influence on the scheduling of work regarding starting and ending times, days off, the taking of breaks during the workday, swapping shifts and taking unpaid leave. It consists of six items scored with either 1 'yes' or 0 'no' derived from the work scheduling autonomy scale (53), two items from the flexibility scale representing flexibility in terms of time (54) and two items based on the measure used in the Nurses Early Exit Study (NEXT) (11): "*Does your roster have a fixed pattern?*" and "*Is it easy to swap shifts?*". The latter four items were scored on a 5-point response scale and were dichotomized by median split so that the higher scores reflected 1 'yes' and the lower scores reflected 0 'no'. Factor analysis showed a three factor structure: control over work pace, control over starting and ending times and control over amount of days off. Because two of the subscales showed a low internal consistency and deleting items did not increase the reliability, it was decided to treat the items as belonging to one scale.

Ethical considerations

The study was not submitted to an ethical committee because according to Dutch law (Wet Medisch-Wetenschappelijk Onderzoek met Mensen/Medical Research Involving Human Subjects Act), surveys only have to be submitted to an ethical committee in a limited number of situations which do not apply to the current study. The study was approved by the management board of the nursing homes involved. The participants were informed by individual letter and an institutional newsletter, they were free to refuse to participate and welcomed to ask questions and express concerns about the study any time. Return of a completed questionnaire was taken to imply consent. Data were stored anonymously, treated confidentially and the participants' privacy was sufficiently guaranteed.

Data analysis

Data were analysed using IBM SPSS version 20. A frequency distribution of all different work patterns, and means and standard deviations of starting and ending times were computed. In order to develop a new typology, based on the five criteria mentioned in the introduction, the following contrasts were inspected: fixed shift pattern versus rotating shifts, nightshifts versus no nightshifts, and early shifts versus day shifts. The internal consistency of the scales was determined by Cronbach's alpha reliabilities. Descriptive statistics were computed for the independent and dependent variables. One-way ANOVAs with post-hoc analyses (Tukey), Chi-square and Kruskal-Wallis tests were used to test for significant differences in the study variables between the new work schedule types. Where ANOVAs were used, post-hoc analyses (Tukey) were performed to test the differences. Where the Kruskal-Wallis test was used (e.g. level of education), post-hoc Mann-Whitney tests with Bonferroni correction (.05/10 tests: .005 level of significance) were performed to test differences between work schedule types.

RESULTS

The demographics of the nurses are shown in Table 1.

Table 1: Characteristics of nurses and schedules (N=498)

Nurses' descriptives		Values		
Women		483		(96.8%)
Age	Mean (SD)	42.2	years	(SD = 11,95)
Nurse educational level* (n = 474):	Mode	Level	3	
Full-time contract	Amount (%)	28		(5.7%)
Job status (permanent)	Amount (%)	442		(89.1%)
Average years working in the current job	Mean (SD)	9.2	years	(SD = 8.1)
Living together	Amount (%)	394		(80.6%)
Partner's job status (is working)(n=408)	Amount (%)	362		(88.7%)
Partner has shiftwork (yes)	Amount (%)	91		(26.1%)
Average hours worked per week of partner	Mean (SD)	37.7		(SD =7.86)
Having children living at home	Amount (%)	288		(58.4%)
Taking care of child<12 years	Amount (%)	163		(32.9%)
Days day care per week	Mean (SD)	0.38	days	(SD = 1.0)
Hours spent on care for family members per week	Mean (SD)	1.47	hrs	(SD = 2.95)
Minutes commuting time per workday	Mean (SD)	37.7	min	(SD =26.5)
Nurses' contribution to total household income	<25%	77		(16.2%)
	25%–75%	312		(64.9%)
	> 75%	91		(18.9%)
Work schedule descriptives				
Average number of hours worked per week	Mean (SD)	22.0	hrs	(SD = 8.79)
Average number of overtime hours worked per week (n = 469):	Mean (SD)	3.0	hrs	(SD = 4.66)
Worked nights (n = 462):	Amount (%)	190		(41.2%)
Average nights worked per month of those working nights	Mean (SD)	3.8	nights	(SD = 2.97)
Working weekends	Amount (%)	472		(95%)
Average number per month of days worked during weekends	Mean (SD)	3.8	days	(SD = 1.87)
Start morning shift (n=433)	Mean (SD)	07:04	AM	(SD = 0:16 min)
End morning shift	Mean (SD)	14:42	PM	(SD = 1:31 min)
Start afternoon shift (n=397)	Mean (SD)	14:58	PM	(SD = 1:11 min)
End afternoon shift	Mean (SD)	22:38	PM	(SD = 0:50 min)
Start night shift (n=204)	Mean (SD)	22:49	PM	(SD = 0:14 min)
End night shift	Mean (SD)	07:10	AM	(SD = 0:07 min)

*The educational level was distinguished by five levels: L1: care helper level 1, L2: care helper level 2, L3: care worker level 3, L4: nurse level 4 implying secondary vocational education, and L5: nurse level 5 implying higher vocational education.

The final sample comprised mainly women, the mean age was 42.2 years (range 18–65), and 5.7% had full-time contracts (that is, 36 hours per week). The most common educational level was level 3 with qualification level 1 (care helper level 1) as the lowest and qualification level 5 (registered nurse) as the highest educational level. About half of the nurses had children living at home and one-third of the nurses had children under the age of twelve. A quarter of the nurses’ partners worked in shifts.

The average number of shifts in the weekends of the 95% of nurses who worked weekends was 3.8 per month. The average number of night shifts of the 41.1% of nurses who worked nights was 3.8 per month. Noticeable are the large standard deviations of the starting times and ending times of the morning and the afternoon shifts, ranging from 50 until 91 minutes.

The socio-demographics of non-respondents ($n = 476$; 49%) were not significantly different from those of the participants (e.g. average number of hours and average number of overtime hours each week, income, type of position and sickness absence duration), except that the non-respondents were younger; 37.5 years ($SD = 11.83$ years) ($p < 0.01$) versus 42.2 years ($SD = 12.04$ years) of the respondents conducted with organizations’ reports.

New typology

On the basis of our five criteria, a first draft typology was developed, consisting of eight types: Fixed shifts (frequency):

- a) fixed early shifts (9.2%),
- b) fixed ‘normal’ day shifts (1%),
- c) fixed afternoon shifts (5.8%), and
- d) fixed night shifts (4.4%).

Rotating shifts (frequency):

- e) early in combination with afternoon shift (42.6%),
- f) early in combination with night shift (1.2%),
- g) afternoon in combination with night shift (2.6%), and
- h) rotating three shift pattern (33.1%).

The (b), (c), (d) (f) and (g) types of work schedules were reported by five, twenty-nine, twenty-one, six and fourteen respondents respectively and therefore did not fulfil the fourth requirement formulated in the background. We finally distinguished five types that fulfilled all five requirements:

- Type 1: fixed early shift (a)
- Type 2: rotating two shift pattern (early and afternoon shifts) (e)
- Type 3: rotating three shift pattern (early, afternoon and night shifts) (h)
- Type 4: fixed and rotating two shift pattern including night shift (d, f, g)
- Type 5: fixed normal day or afternoon shifts (b, c).

Table 2: Work schedule characteristics of the different types of work schedules

	Type of work schedule*					Total	F (df)	p	Post-hoc
	1	2	3	4	5				
Prevalence of type of schedule	9.2%	42.6%	33.1%	8.2%	6.8%	100%			
Average number of hours worked per week (SD)	22.9 (8.46)	20.3 (8.75)	25.7 (8.02)	19.1 (8.18)	17.1 (7.26)	22.0 (8.79)	$F=14.135$ (4, 482)	$p=.000$	2, 4, 5<3
Average number of overtime hours per week (SD)	3.3 (5.8)	2.8 (4.43)	3.1 (4.67)	2.5 (4.57)	3.1 (4.48)	2.95 (4.66)	$F=.263$ (4, 463)	$p=.902$	
Days off between shifts (SD)	2.5 (1.21)	2.6 (1.25)	2.2 (.86)	5.0 (2.88)	3.1 (2.59)	2.7 (1.62)	$F=28.287$ (4, 465)	$p=.000$	3<5<4
Knowing work schedule at least 2 weeks in advance	100.0%	91%	93.9%	92.5%	96.9%	93.3%	$\chi^2=5.668$	$p=.225$	

*: 1 = fixed early shifts; 2 = rotating 2-shift (early and afternoon shifts); 3 = rotating 3-shift (early, afternoon and night shifts); 4 = fixed nightshift or 2-shifts including night shift and 5 = fixed shifts normal day or afternoon shifts.

Because almost all nurses worked weekends, no distinction was made between working weekends or weekdays. As can be seen in Table 2, the most prevalent type of work schedule was the type 2 schedule (early and afternoon two shift schedule) followed by the type 3 schedule (rotating three shift schedule).

Differences between the five types

As can be seen in Table 2, there were noticeable differences between the types of work schedules. The average number of hours worked per week differed significantly between nurses working in the different types of schedules. Nurses with type 3 schedules worked on average substantially more hours than nurses with the type 2, 4 and 5 schedules. Overtime hours per week did not differ among nurses with different types of work schedules. Days off between two series of shifts as an indicator of the possibility to recover or to take a rest differed significantly between nurses in the five types of work schedules; nurses with type 3 schedules had fewer days off than those with type 4 and 5 schedules. No differences between the five types of work schedules were found regarding the moment nurses were informed about their work schedules.

Table 3: Socio-demographic and family characteristics of the nurses working in the different types of work schedules (% and mean (SD))

	Type of work schedule*					Total		p	Post-hoc
	1	2	3	4	5				
Sex (female)	89.1%	97.2%	97.6%	100%	97.1%	96.8%	$\chi^2=10.39$	p=.034	
Age years (SD)	47.8 (9.7)	42.9 (12.2)	37.7 (11.7)	47.3 (8.3)	46.1 (10.9)	42.2 (11.9)	$F=12.232$ (4, 488)	p=.000	3 < 1, 4, 5
Nurse educational level**							$\chi^2(4)=31.510$	p=.000	1,2< 3
L1	7.0%	8.4%	0%	7.7%	0%	4.9%			
L2	27.9%	25.7%	6.8%	10.3%	13.8%	17.5%			
L3	46.5%	54.0%	75.2%	66.7%	65.5%	62.2%			
L4	14.0%	9.9%	16.1%	12.8%	13.8%	12.9%			
L5	4.7%	2.0%	1.9%	2.6%	6.9%	2.5%			
Average years working in the current job	10.7 (9.45)	9.6 (8.07)	6.8 (6.92)	12.5 (9.06)	11.7 (8.13)	9.2 (8.13)	$F=6.811$ (4, 489)	p=.000	3<1,2,4,5
Job status (% permanent)	93.5%	86.3%	88.4%	95.1%	97.1%	89.1%	$\chi^2=6.487$	p=.166	
Living together (yes)	82.6%	79.3%	77.6%	90.2%	88.2%	80.6%	$\chi^2=6.716$	p=.568	
Partner's job status (is working)	76.3%	89.9%	91.8%	83.8%	90.0%	88.7%	$\chi^2=8.290$	p=.082	
Partner has shiftwork (yes)	17.2%	22.8%	30.5%	32.3%	26.9%	26.1%	$\chi^2=3.829$	p=.430	
Average hours worked per week of partner (SD)	37.2 (5.46)	36.9 (9.72)	38.2 (6.71)	38.2 (2.82)	38.8 (7.47)	37.7 (7.86)	$F=.663$ (4, 330)	p=.618	
Taking care of children<12 years (yes)	23.9%	37.4%	28.7%	36.6%	32.4%	32.9%	$\chi^2=5.250$	p=.263	
Days day care per week (SD)	0.18 (0.72)	0.48 (1.11)	0.38 (1.0)	0.23 (0.74)	0.24 (0.82)	0.38 (1.0)	$F=1.388$ (4, 482)	p=.237	
Hours spent on care for family members per week (SD)	2.1 (4.3)	1.30 (2.31)	1.43 (3.18)	1.97 (3.27)	1.34 (2.75)	1.47 (2.95)	$F=.979$ (4, 481)	p=.418	
Minutes commuting time per workday (SD)	28.0 (24.2)	37.7 (26.2)	40.9 (27.0)	31.6 (19.4)	44.0 (32.7)	37.7 (26.5)	$F=3.142$ (4, 481)	p=.014	3>1
Nurses' contribution to total household income							$\chi^2(4)=15.015$	p=.005	3>2
<25%	17.8%	21.8%	6.9%	14.6%	24.2%	16.0%			
25%–75%	57.8%	59.4%	73.0%	75.6%	57.6%	65.0%			
>75%	24.4%	18.8%	20.1%	9.8%	18.2%	19.0%			

*: 1 = fixed early shifts; 2 = rotating 2-shift (early and afternoon shifts); 3 = rotating 3-shift (early, afternoon and night shifts); 4 = fixed nightshift or 2-shifts including night shift and 5 = fixed shifts normal day or afternoon shifts.
**=L1=care helper level 1, L2=care helper level 2, L3=care worker level 3, L4=nurse level 4 implying secondary vocational education, L5=nurse level 5 implying higher vocational education.

As can be seen in Table 3, there were a number of significant differences with respect to the socio-demographic and family characteristics. The amount of women working in the types of work schedule and the age of nurses working in the different types of schedules differed. Nurses with type 3 schedules were significantly younger than nurses with other types of work schedules, except

for nurses with type 2 schedules. Educational level differed significantly. Nurses with type 1 and type 2 schedules had lower educational levels than nurses in type 3 schedules. The average years that nurses worked in the current job differed between the nurses; nurses with type 3 schedules worked considerably less years in the current job than nurses in the other type of schedules. Living with a partner, having an employed partner or not, the average number of their partners' work hours per week, having a partner with shiftwork or not, taking care of children under the age of twelve, number of days children spent in day care per week, number of hours spent on care for family members per week did not differ between the types. Commuting time per workday differed significantly. Nurses with type 3 schedules had more commuting minutes per workday than nurses with type 1 schedules. Nurses with type 3 contributed more to the total household income than nurses with type 2.

With respect to the appraisal of the work schedule, it can be seen in Table 4 that satisfaction with the work schedule differed significantly. Nurses with type 3 were less satisfied with their work schedule than nurses with type 4 schedules. Finally, the work schedule control differed. The nurses with type 3 schedules experienced considerable less control over their work schedule than all other nurses except for nurses with type 4 schedules.

Table 4: Nurses' appraisal of the different types of work schedules

	Type of work schedule*					Total	F (df)	p	Post-hoc
	1	2	3	4	5				
Satisfaction with work schedule (Mean (SD))(score 1–5)**	3.7 (.42)	3.56 (.59)	3.4 (.57)	3.75 (.71)	3.75 (.48)	3.54 (.59)	$F=4.012$ (4, 447)	p=.003	3 < 4
Work schedule control (Mean (SD)) (score 0–1)***	.48 (.29)	.37 (.21)	.30 (.21)	.36 (.17)	.46 (.24)	.36 (.22)	$F=8.108$ (4, 480)	p=.000	3<1,2, 5

*: 1 = fixed early shifts; 2 = rotating 2-shift (early and afternoon shifts); 3 = rotating 3-shift (early, afternoon and night shifts); 4 = fixed nightshift or 2-shifts including night shift and 5 = fixed shifts normal day or afternoon shifts.
** : Higher values indicate more satisfaction with irregular working hours
*** : Higher values indicate more work schedule control

DISCUSSION

This paper presents a new typology of work schedules based on data of 498 nurses working in elderly care institutions in the Netherlands. This new typology could improve research on work schedules. Based on predetermined criteria and frequencies of all possible working schedules found in this sample (n=24) a new typology of work schedules consisting of five types is proposed. Next, the differences between the five types in terms of schedule characteristics, nurses' characteristics (socio-demographics and family characteristics) and appraisal of the work schedule were studied. A considerable amount of differences between the types of schedules was found regarding work schedule characteristics, the nurses' socio-demographic characteristics and nurses' appraisal of the work schedule.

The new typology of nursing work schedules

There is a need for a more sophisticated typology (6) which also better represents the increasing diversity in work schedules over time (2, 3, 29). We think that the new typology found in this study, is an improvement because it takes into account the most frequently reported types of work schedules and moreover, these types differ regarding work schedule characteristics, nurse characteristics and appraisal of the work schedule. The new typology of schedules introduced in this study is based, as a starting point, on the most prevalent and more traditional two and three rotating schedules. Next, fixed shifts are distinguished. The new typology is meaningful for practice, because it seems to also represent differences regarding the nurses who work in the different types and their appraisals of the work schedules. Besides the distinction between weekends and non-weekends, which is not used in our typology, Our typology parallels the frequencies of different types reported in other research (18, 19, 37).

Differences between the five types

Using this new typology, important differences were detected between the nurses working in the five types of schedules, which further validates the new typology. The work of nurses with type 3 schedules (with a rotating three shift pattern) was - in agreement with other research - characterized by more negative features than the work of nurses in other schedules (11, 22, 32, 55). These nurses were least satisfied with their work schedule as was also found in other research (11), and they were even less satisfied than a comparable group of nurses in another study (42). It seems that in the experience of the nurses, the three shift schedule has more disadvantages than a two shift schedule. Furthermore, they indicated to have the least control over their work schedule. This is probably due to the rotating pattern which makes it more difficult to swap shifts and to schedule starting and ending times. These findings confirm the importance of including the appraisal of the work schedule in this study and in future research.

Nurses with the type 3 schedules worked the most hours on average, commuted the most minutes per workday and had the fewest days off in between shifts. Having days off is normally seen as an opportunity to recover from work (29, 56, 57) and more commuting hours could limit the available time to recover. Furthermore, these nurses were on average the youngest group and worked on average the least years in the current job which, in line with the conclusion of Winwood et al. (55), could indicate (Winwood, et al., 2006) that younger, inexperienced nurses working in type 3 schedules may require greater support from their organization, even though in our case their mean age was already 37 years. Nurses working in type 1, 4 and 5 schedules were on average about 10 years older.

Nurses with other types of work schedules than type 3 also have some noticeable characteristics. Nurses working in type 1 schedules appeared to have lower commuting time per workday than nurses working in type 2 schedules and they experienced higher work schedule control than nurses

working in a type 3 schedule. Nurses working in type 2 schedule differed from nurses working in type 1 schedule because they work fewer hours on average per week. Possibly, the type 2 schedule offers more room for nurses to adjust the schedule to their preferences (58). The main difference between nurses in these types of schedule and nurses working in type 4 schedules was that the work of nurses in type 4 schedules was characterised by higher satisfaction with work schedule and more days off between shifts. Nurses with type 4 and 5 schedules were comparable except for the latter being characterized by experiencing higher work schedule control. Type 4 schedule was characterized by fixed nightshifts and obviously these nurses had less room to adjust their work schedule than nurses working in type 5 shifts with fixed normal day of afternoon shifts.

Different career stages?

Taking the above results into further consideration, the current findings regarding age differences across the different types of work schedule is striking and do not seem to reflect the variety in family responsibilities between life stages. They might represent a specific career pattern. It might be that younger nurses prefer to start their careers with type 3 schedules, either because of primary or self-selection (15, 59), their organization's advice, or because of the higher wages, which could be preferable in this stage of life. With increasing age, they probably want to change to a less demanding type of schedule (60), because they might have trouble tolerating shiftwork (29, 61). This might explain why the type 5 schedule is characterized by a higher prevalence of older, level 5 nurses who work less hours compared to nurses with type 3 schedules.

Limitations

The criteria for the new typology were sufficient to construct a typology, which reveals differences between nurses working in different types of shifts. Response was moderate to high (51%) and the respondents were comparable with Dutch elderly care nurses in general regarding age, sex, average work week and number of years at the current job (3). The respondents were thus representative for the residential elder care population they came from, except that non-respondents were slightly younger than respondents were. It can thus be concluded that selective dropout is not a serious problem in the present study. The nurses included in this research are representative for nurses working in residential elder care in the Netherlands who work largely across 8 hour shifts. Countries vary in their shift length. Although twelve-hour shifts are increasingly used across Europe (36), they are not common in the Netherlands, Belgium, Germany, Greece, Norway, and Sweden (62). Our typology could therefore be generalizable to those countries. Generalizations of our typology to countries with nurses working in twelve-hour shifts (e.g. England, Ireland, and Poland) should be made with care. The possibility exists that using the same method could produce a altered typology of work schedule.

Because we limited the number of different types of work schedules for reasons of feasibility, employees with slightly different work schedules might have been classified in the same type. In practice, one should not forget that for an individual employee, a one hour difference in starting times could be a meaningful difference in relation to bringing children to school or allowing for more sleep (63). Type 4 work schedules contained both fixed and rotating shifts, including nightshifts. These were combined because they all contained night shifts. Research by Demerouti et al. (64) showed that employees with rotating shifts reported less job satisfaction than employees working in fixed shifts. This might have led to a slight underestimation of the differences between type 4 and the other types.

Considering the scales used, the Cronbach's alpha reliability of the Satisfaction with Irregular Working times was good (Cronbach's alpha 0.92) and of the work schedule control scale was sufficient (Cronbach's alpha 0.66) (65). For ANOVA's with five groups, power should be sufficient in the present study (66, 67).

CONCLUSION

All in all, it is possible to distinguish five main types of work schedules among nurses working in residential elder care in the Netherlands. A considerable amount of differences was found between the types of schedules regarding work schedule characteristics, the nurses' socio-demographic characteristics and the nurses' appraisal of the work schedule. This indicates sufficient construct validity of the new typology. The new typology seems useful to classify shifts on a more detailed level, which is of utmost importance for research and might be useful for employers as well.

Practical and scientific implications

The present typology of nurses' work schedules is based on empirical research and seems a promising typology for research regarding work-related health and employability. To get an even more precise picture, research focusing on the health-related characteristics of the nurses working in the different types might be useful.

It would be valuable to validate the typology in other health care professions with shift work and to develop a new typology for nurses working twelve-hour shifts.

The new typology may not only be useful for researchers because of its conciseness, but also for employers and nursing managers for monitoring nurses' employability. However further longitudinal research is warranted to elucidate whether, how and why nurses change work schedule types during their careers and if so, what the consequences are.

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Sustainable employability in shiftwork: related to types of work schedule rather than age.

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ABSTRACT

Purpose There is scarce research on age and sustainable employability of nurses working in various types of work schedules. Earlier research showed that nurses working in work schedules differ regarding age. Different operationalisations of age might explain variations in sustainable employability. Therefore, the aim of this study was to investigate how nurses working in various types of work schedule differ regarding sustainable employability, and the role that age plays in these differences. Age was defined as chronological age, organisational age, life-span age, and functional age.

Method Questionnaires were distributed to 974 Dutch nurses in residential elder care (response rate 51 %) with questions about the type of work schedule, aspects of sustainable employability, various operationalisations of age, and registered sickness absence data were used.

Results Nurses working in various types of work schedules differed regarding aspects of sustainable employability, also when operationalisations of age were added. The 'life-span age' was directly related to aspects of sustainable employability. Statistically, work ability and job satisfaction were only explained by varying operationalisations of age.

Conclusions Nurses' sustainable employability appeared to be mainly related to differences between the types of work schedule rather than age. Fixed early shifts are characterised by the most positive aspects of sustainable employability, and three rotating schedules score worst. To improve sustainable employability, organisations should implement a system in which nurses with different types of work schedule are monitored in combination with their life-span perspective.

INTRODUCTION

The shortage of nurses due to an ageing nursing workforce is an increasing problem in the Netherlands and globally (1-3). This suggests that more attention should be paid to sustainable employability of the nursing workforce (4). Sustainable employability is defined as employees having the opportunity to perform work with the preservation of health and well-being during their working life, now and in the future (5). Possible determinants of nurses' sustainable employability could be found in personal and occupational characteristics (6-10).

Work schedules and working hours warrant specific attention, because both are linked to a wide range of negative consequences, e.g. self-rated health, fatigue, work-home interference, job satisfaction, decline in performance, and sick leave (11-18). Moreover, work schedules and working hours are high on the list of factors that contribute to nurses leaving the profession (19-21). An increasing variety in types of work schedules has arisen due to the preferences of both employers and employees (16, 22-24). This variety enlarges the need for a new, distinct typology to detect differences with respect to (negative) consequences (25).

To understand the contemporary variety in work schedules, a new evidence-based typology was developed based on both scientific literature (26-28) and empirical findings (29). The newly developed typology shows sufficient construct validity and seems useful to classify the shifts on a more detailed level. Using this new typology of five types of work schedule, differences were found between nurses working in the types of schedules regarding their work schedule characteristics, socio-demographic characteristics, and their work schedule appraisal. The schedule with three rotating shifts appeared to be the most unfavourable, as also reported by others (3, 18, 30, 31); it was characterized by more negative features including a high number of working hours, few days off between the shifts, less satisfaction with the work schedule, and a low amount of work schedule control (29).

Chronological age also appeared to differ between the types of work schedule (29) (29, 30). Nurses with three rotating shifts had an average age of 38 years and were significantly younger than nurses with other types of work schedule (mean age 46-48 years), except for nurses with two rotating schedules (29). This finding might represent a specific career pattern or selection process during a nurse's career (30).

Especially for nurses, older age seems to be negatively related to work ability and job satisfaction; on the other hand, it is positively related to better recovery and less fatigue (30, 32-35). Furthermore, older age is related to more prolonged sick leave, whereas younger age is related to more frequent sick leave (36). In their review, Blok and De Looze (37) concluded that it is unclear whether older employees have more problems with tolerance to shift work compared with younger employees. These findings highlight the complexities in understanding the relationship between shift work and aging (38).

In the above-mentioned studies, age was operationalized as calendar age, but calendar age may be an inadequate operationalization of age in the work context. Because age refers to many changes in biological, psychosocial and social functioning over time, it has been suggested that more than one conceptualization is needed to operationalize age (39, 40). Five operationalizations of age have previously been applied: 1) chronological age, 2) organizational age, 3) life-span age, 4) psycho-social age, and 5) functional age. *Chronological age* refers to the calendar age. *Organizational age* refers to the aging of individuals in jobs and organizations and is mostly operationalized as working history. *Life-span age* emphasizes the influence of family life and economic constraints on behavioural changes in the life cycle and the consequences for their work approach and can best be measured by the private situation. *Psycho-social age* refers to the environment and employees' experiences of age (39). Finally, *functional age* refers to the neurocognitive and physical decline with ageing, for which a healthy lifestyle is used as a proxy (6, 38-40).

Thus, overall, work schedules are related to aspects of sustainable employability. Age differs between the various types of work schedule and it is indicated that age is associated with sustainable employability. Chronological age seems to be a proxy for other age-related processes which might influence sustainable employability (41). However, because few studies have examined the relationship between types of work schedule, age and sustainable employability among nurses (37, 42), more research on employability and age is needed (43).

Aim

The main aim of this study is to describe expected differences between the five types of work schedule of the new typology (29) for the following aspects of sustainable employability: health, fatigue, work ability, emotional exhaustion, work engagement, work-home interference, job satisfaction, and sickness absence. Furthermore, to establish to what extent various operationalizations of age explain these differences.

The research questions are as follows:

1. *What are the differences in sustainable employability (e.g. health, fatigue, work ability, emotional exhaustion, work engagement, work-home interference, job satisfaction, and sickness absence) between nurses working in the five types of work schedule described in the new typology of work schedules?*
2. *When differences in sustainable employability are found, how are they related to the types of work schedule, or to age (operationalized as chronological age, organizational age, life-span age and functional age), or to a combination of work schedule and age?*

METHOD

Design and procedure

A cross-sectional study was performed in which a questionnaire was sent to the home address of all nursing staff of three large residential care organizations in the Netherlands. Nurses were asked to return the questionnaires within two weeks. Reminder letters were sent to non-responders at two and three weeks after the initial distribution of the questionnaires.

Sample

The study involved nurses working shifts or irregular working hours in residential elder care. The three homes that participated were asked to participate because the work schedules of the nurses reflected the variety of nursing work schedules most common in the Netherlands. Nurses were included only if they reported their type of work schedule. Of all 1009 nurses invited to participate, 974 met the inclusion criteria. Of these 974 nurses, 498 returned the questionnaire (response rate of 51%). Table 1 presents the characteristics of the participating nurses.

Data collection

In October 2009, via the questionnaire, information was gathered about the type of work schedule, age and health, work ability, work engagement, work-home interference, and job satisfaction. Furthermore, registered sickness absenteeism data were used. Educational level and hours worked on a contractual basis were not related to the outcomes and were left out of the analyses.

Type of work schedule

The work schedule was measured by asking the respondents when their working days began and ended, and which shifts they worked (morning, afternoon and night shifts). They were also asked whether they worked other shifts besides the standard morning, late and night shifts. Initially, 24 different shifts were mentioned; after a first evaluation, these were reduced to eight different shifts. Finally, five types of shifts were distinguished and coded as follows (29):

- Type 1: fixed early shift;
- Type 2: rotating two-shift pattern (early and afternoon shifts);
- Type 3: rotating three-shift pattern (early, afternoon and night shifts);
- Type 4: fixed and rotating two-shift pattern including night shift;
- Type 5: fixed normal day or afternoon shifts.

Age

- In this study, age was operationalized in four ways (39) as follows:
1. **Chronological age** was operationalized as calendar age in years (range 18-65 years).

2. Organizational age was operationalized as the working history as a nurse.

3. Life-span age can best be measured by life stage or family status. According to Peeters et al. (44), besides the structural home characteristics, it is important to include the perception of these characteristics (44). Therefore, life-span age was measured with (three) structural home characteristics and (four) psychosocial home characteristics, according to Karasek's Job Demand Control Support model. The structural home characteristics are: 1) the number of children aged ≤ 12 years, 2) the amount of child care, and 3) the amount of informal care per week. The psychosocial home characteristics are measured by: 1) emotional home demands, 2) quantitative home demands, 3) home autonomy, and 4) social support at home. Emotional home demands contain four items and quantitative home demands five items; both are scored on a 4-point scale ranging from 0 'never' to 3 'always'. Example items are: *"How often do emotional issues arise at home?"* and *"Do you find that you are busy at home?"* The internal consistency (Cronbach's alpha) is 0.81 and 0.78, respectively (44). Home autonomy contains four items scored on a 5-point response scale, ranging from 0 'never' to 4 'always'. An example item is: *"I have control over how I use my free time"* (45). The internal consistency (Cronbach's alpha) is 0.74. Social support at home contains eight items (measuring social support from one's spouse, relatives and friends) scored on a 5-point response scale ranging from 0 'never' to 4 'always'. An example item is: *"To what extent is/are your [spouse/relatives/friends] willing to listen to your problems?"* The internal consistency (Cronbach's alpha) is 0.88 (46).

4. Functional age: to measure this, a healthy lifestyle was used as a proxy (40). Healthy lifestyle was measured with a compound scale that provides information on five behaviours: physical activity, smoking, alcohol use, consumption of fruit or vegetables and quality of sleep. It provides an 'optimal lifestyle index' (47). Each behaviour is classified as a binary variable. Meeting the norm for each behaviour is scored '1' and not meeting it is scored '0'. Scores are summed to form a lifestyle index ranging from 0 'low adherence' to 5 'high adherence' (reflecting the healthiest lifestyle). In accordance with the Dutch Standard for Healthy Exercise, *physical activity* was assessed as the number of days in a usual week that nurses are engaged in activities that are vigorous or of moderate physical intensity (48). The criterion for a score of 1 was met if nurses engaged in ≥ 150 min/week of moderate physical activity or engaged in ≥ 60 min/week of vigorous activity. *Smoking* was assessed with the question "Do you smoke?". 'No' scored 1. *Alcohol consumption* was assessed using the average number of alcohol drinks per week. Not more than 7 units of alcohol per week for women and not more than 14 units for men was scored 1 (Health Council Netherlands, 2006). *Fruit and vegetable consumption* was assessed by asking on how many days ≥ 200 g of fruits and vegetables were consumed in a typical week. A score of 1 required seven days per week for both fruit and vegetables. *Quality of sleep* was assessed with the sleep quality scale in the Dutch Quality of Work Questionnaire [Vragenlijst Beleving en Beoordeling van de Arbeid (VBBA)], which contains 14 subjective items. An example item is *"When I wake up in the night, it is hard for me to fall*

asleep again". Each item was scored as either 'yes' (1) or 'no' (0); the scores were then averaged, with a higher score indicating more sleep complaints. The internal consistency (Cronbach's alpha) is 0.88. The median split method ($Med = 0.22$) was used to dichotomize this scale into high quality of sleep (scored 1) and low quality of sleep (scored 0).

Due to lack of research on **psychosocial age** (40) this item was left out of the present study.

Sustainable employability

Health, work ability, work engagement, work-home interference, job satisfaction and sick leave are important indicators (or proxies) which are used to measure sustainable employability (6, 10, 20, 43, 49, 50). Therefore the following aspects of sustainable employability were used:

General health was measured using a single item asking *"In general, how satisfied are you with your health?"* which was scored on a 10-point scale from 1 'very dissatisfied' to 10 'very satisfied'.

General fatigue was measured with the Multidimensional Fatigue Inventory (MFI) (51). This scale has four items scored on a 5-point scale ranging from 'yes, that is true' to 'no, that is not true'; a higher score indicates more general fatigue. An example item is 'I feel very tired'. The internal consistency (Cronbach's alpha) is 0.84.

Emotional exhaustion was measured using the Dutch version of the Maslach Burnout Inventory (52). This instrument is particularly suitable for use in human services professions like nursing. Moreover, emotional exhaustion is the most characteristic burnout dimension. The scale has five items scored on a 7-point scale ranging from 0 'never' to 6 'always'. An example item is: *"I feel burned out about my work"*. The internal consistency (Cronbach's alpha) is 0.84-0.90.

Work ability was measured using a single item of the Work Ability Index (WAI) asking 'The subjective estimation of the current work ability compared with the lifetime best', with a possible score of 0 'Completely unable to work' to 10 'Work ability at its best'. This item has shown a strong correlation with the total WAI and is a good alternative to the WAI for assessing the status and progress of work ability (53).

Work engagement was used to measure the positive, work-related state of fulfilment and was measured with the short version of the Utrecht work engagement scale (UWES-9) (54). It contains nine items and is a reliable and valid self-report questionnaire (55). Participants respond on a 7-point Likert scale, ranging from 0 'never' to 6 'always and daily'. Higher scores indicate greater work engagement. An example item is: *"At my work I feel bursting with energy"*. The internal consistency (Cronbach's alpha) is 0.93.

Work-home interference was measured using a scale from the Survey Work-Home Interference Nijmegen designed to measure types of work-home interference on aspects of strain and time (56). It has eight items scored on a 4-point scale, ranging from 0 'seldom or never' to 3 'very often'. A higher score reflects more interference. An example item is *"How often does it happen that your*

work schedule makes it difficult for you to fulfil your domestic obligations?”. The internal consistency (Cronbach’s alpha) of the scale is 0.84.

Job satisfaction was measured using a single item asking “How satisfied are you with your job in general?” scored on a 10-point scale ranging from 1 ‘very dissatisfied’ to 10 ‘very satisfied’.

Sickness absence was assessed using the organizations’ absenteeism reports. Sickness absence due to pregnancy was not categorized as sickness absence. Sickness absence was registered by the organization according to the number and duration of absence episodes for each person and were linked to the data from the questionnaire by a code. To measure the sick days duration, the total number of sick days that each employee had taken between 1 October 2008 and 1 October 2009 was counted, irrespective of the actual working hours. Because the distribution of the number of sick days was skewed, this variable was recoded into ‘no absence’, ‘short’ (<8 days) and ‘prolonged’ (>7 days) sickness absence in accordance with the Dutch Bureau of Statistics (57). The frequency of sickness absence episodes was assessed as the number of absences between 1 October 2008 to 1 October 2009. This variable showed a normal distribution and was treated as a continuous variable.

Ethical considerations

The study was not submitted to an ethical committee because, according to Dutch law (Wet Medisch-Wetenschappelijk Onderzoek met Mensen/Medical Research Involving Human Subjects Act), surveys only have to be submitted to an ethical committee in a limited number of situations, and does not apply to the present study. This study was approved by the management board of the three nursing homes involved. The participants were informed by an individual letter and an institutional newsletter, they were free to refuse to participate and were encouraged to ask questions or express concerns about the study at any time. Return of a completed questionnaire was taken as implied consent. Data were stored anonymously and treated confidentially. Participants were not subjected to invasive treatments, and the participants’ privacy was sufficiently guaranteed.

Data analysis

Data were analysed using IBM SPSS version 20.0. Cronbach’s alpha reliability was used to measure the internal consistency of the scales. Descriptive statistics were computed for the variables.

To answer the research questions, one-way ANOVAs were used to test for significant differences in the study variables between the five types of work schedule. Because no assumptions about the differences were present, ANOVAs were used instead of linear regression analysis with dummy coding for the types of schedule. When ANOVAs were used, post-hoc analyses (Tukey) were performed. The general linear model ANCOVAs were used to repeat the analysis for each aspect of sustainable employability in different models when introducing different operationalizations of age as a covariate. Types of work schedule and the different operationalizations of ages were entered into the analysis at the same time. To detect the partial effect size of the type of work

schedule and age on health, work ability, work engagement, work-home interference and sickness absence, partial etas squared (η_p^2) were computed. Cohen’s effect sizes were used (58) ($\eta_p^2=0.01$ a small effect, $\eta_p^2=0.06$ medium effect and $\eta_p^2=0.14$ a large effect). A log10 transformation was used to approach a normal distribution, because sickness absence duration had considerable skewness (3.28). After this transformation, the indices for skewness and kurtosis were within the ranges (0.94 and 0.152, respectively) (59). B-values were computed to indicate the direction of the relationship of age with the indicator variables, except for type of work schedule as it is not possible to compute b-values for a nominal variable.

Validity and reliability

Validated scales were used. For factors, combined in scales, Cronbach’s alpha reliability was higher than 0.70, which is considered acceptable (60). Assuming small to medium effect sizes with five groups, statistical power should be sufficient in the present study (58, 61).

RESULTS

The characteristics of the nurses are presented in Table 1.

Table 1: Description of nurses and operationalizations of ‘age’ (n=498)

			Values
Women		482	(96.8%)
Average number of hours worked per week	Mean (SD)	22.0	(SD = 8.79)
Average number of overtime hours worked per week (n=469):	Mean (SD)	3.0	(SD = 4.66)
Full-time contract		28	(5.7%)
Job status (permanent)		442	(89.1%)
Worked nights (n=462):		190	(41.1%)
Average no. of nights worked per month of those working nights	Mean (SD)	3.8	(SD = 3.0)
Working weekends		472	(95%)
Operationalizations of age			
Chronological Age			
Age in years	Mean (SD)	42.2	(SD = 11.95)
Organizational age			
Average years working in the current job	Mean (SD)	9.2	(SD = 8.1)
Life-span age			
Taking care of child aged <12 years		163	(32.9%)
No. of days of day care per week	Mean (SD)	0.38	(SD = 1.0)
Hours spent on informal care per week	Mean (SD)	1.47	(SD = 2.95)
Emotional home demands	Mean (SD)	0.63	(SD = 0.49)
Quantitative home demands	Mean (SD)	1.29	(SD = 0.53)
Social support at home	Mean (SD)	2.63	(SD = 0.77)
Home autonomy	Mean (SD)	2.86	(SD = 0.68)
Functional age			
Healthy lifestyle	Mean (SD)	2.58	(SD = 0.99)

*The educational level was distinguished by five levels: care helper level 1, care helper level 2, care worker level 3, nurse level 4 implying secondary vocational education, and nurse level 5 implying higher vocational education.

The final sample (498) comprised mainly women; the mean age was 42.2 years and 5.7% had full-time contracts (i.e. 36 contractual work hours/week). The most common educational level was level 3. About half of the nurses had children living at home. The majority had a permanent job status and were living together with an employed partner.

Based on the organizations' reports, the socio-demographics of the non-respondents ($n=476$; 49%) showed no significant differences compared with the participants (e.g. for average number of hours/overtime hours per week, income, type of position, and sickness absence duration). However, the non-respondents were on average younger than the respondents, i.e. 37.5 ($SD=11.83$) years vs. 42.2 years ($SD=12.04$ years) ($p < 0.01$).

Table 2 shows that aspects of sustainable employability differed between the types of work schedule. Regarding the indicators of health, nurses with a type 1 schedule experienced a higher level of general health than nurses with a type 5 schedule. Nurses with type 3 and 4 schedules experienced a higher level of general fatigue than nurses with a type 1 schedule. Nurses with type 2 and 3 schedules were more emotionally exhausted than nurses working in a type 1 schedule. Work engagement differed significantly between the types of work schedule. Nurses with a type 3 schedule were more engaged in their work than nurses working in a type 4 schedule.

Table 2: Aspects of sustainable employability: health, work engagement, work ability, work-home interference, job and sick leave by type of work schedules.

Indicators	α	Type of work schedule (ToW) #					ANOVA		η_p^2	
		1	2	3	4	5	Total	F (df)	Post-hoc	ToW
General health (score 1–10)	n.a.	7.89 [§] (1.48)	7.27 (1.52)	7.64 (1.38)	7.10 (1.69)	6.88 (1.45)	7.40 (1.50)	4.143 (4, 487)	5<1	0.033**
General fatigue (score 1–5)	0.89	2.26 (1.14)	2.63 (1.09)	2.81 (1.01)	2.87 (1.19)	2.64 (1.06)	2.68 (1.08)	2.785 (4, 488)	1<3,4	0.022*
Work Ability (score 1–10)	n.a.	7.60 (1.35)	7.16 (1.49)	7.46 (1.43)	7.12 (1.36)	7.03 (1.33)	7.29 (1.44)	1.832 (4, 460)		0.016
Emotional exhaustion (score 0–6)	0.91	1.47 (1.14)	2.07 (1.35)	2.16 (1.35)	1.78 (1.05)	1.91 (1.18)	2.01 (1.31)	3.049 (4, 489)	1<2,3	0.024*
Work Engagement (score 0–6)	0.92	4.64 (.92)	4.45 (.93)	4.70 (.88)	4.18 (1.09)	4.44 (1.25)	4.53 (.96)	3.244 (4, 485)	4<3	0.026*
Work-home interference (score 0–3)	0.87	0.59 (0.39)	0.77 (0.43)	0.86 (0.43)	0.60 (0.42)	0.59 (0.41)	0.76 (0.43)	6.880 (4, 482)	1, 4,	0.054**
Job satisfaction (score 1–10)	n.a.	7.64 (1.48)	7.19 (1.29)	7.23 (1.41)	7.44 (1.60)	7.12 (1.15)	7.26 (1.37)	1.340 (4, 487)	5<3	0.011
Sickness absence episodes (score 0–9)	n.a.	0.86 (1.32)	1.57 (1.61)	1.78 (1.77)	1.15 (1.33)	1.56 (1.48)	1.54 (1.63)	3.338 (4, 450)	1<3	0.029*
Sickness absence duration (score 0–3^a)	n.a.	0.56; (0.85)	0.99; (0.95)	0.81; (0.71)	0.67; (0.76)	0.85; (0.84)	0.85; (0.85)	3.337 (4, 476)	1<2	0.027**

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$; $\eta_p^2 = 0.01$ a small effect, $\eta_p^2 = 0.06$ medium effect, $\eta_p^2 = 0.14$ a large effect.

#: 1 = fixed early shifts; 2 = rotating 2-shift (early and afternoon shifts); 3 = rotating 3-shift (early, afternoon and night shifts); 4 = fixed nightshift or 2-shifts including night shift and 5 = fixed shifts normal day or afternoon shifts.

^a=after log10transformation.

Regarding work-home interference, nurses with a type 3 schedule experienced more work-home interference than nurses with type 1, 4 and 5 schedules.

Regarding sickness absences, nurses' episodes of sickness absence differed significantly between the types of work schedule. Nurses with a type 3 schedule more frequently had absent periods than nurses with a type 1 schedule. Also, the duration of sickness absence showed a significant difference between the types of work schedule. Nurses with a type 2 schedule had a longer duration of sickness absence than nurses with a type 1 schedule. Overall, nurses working in a type 1 shift appeared to fare the best on the aspects of sustainable employability.

Table 3 shows the results of the analyses when different operationalizations of age were added. Only the significant effect sizes are shown (partial eta squared and b -values).

Table 3: Associations of types of work schedule (ToW) and different operationalizations of 'age' as covariates on aspects of sustainable employability.

Aspects of sustainable employability																		
General health (score 1–10)		General fatigue (score 1–5)		Work ability (score 1–10)		Emotional exhaustion (score 0–6)		Work engagement (score 0–6)		Work-home interference (score 0–3)		Job satisfaction (score 1–10)		Sickness absence episodes (score 0–9)		Sickness absence duration (score 0–3 ^a)		
	η_p^2	B	η_p^2	B	η_p^2	B	η_p^2	B	η_p^2	B	η_p^2	B	η_p^2	B	η_p^2	B	η_p^2	B
Chronological age	ToW	.032**	–	.019	–	.014	–	.036**	–	.027*	–	.068**	–	.019	–	.028*	–	
	CAge																	
Organizational age	ToW	.031**	–	.021*	–	.014	–	.028**	–	.024*	–	.052**	–	.011	–	.027*	–	.032**
	OAge					.010*	-.02										.037***	.02
Life-span age	ToW	.047***		.021*	–	.019	–	.018	–	.030**	–	.042**	–	.008	–	.023*	–	.029*
	Ch	.013*	.17					.045***	-.30			.056***	-.10					
	ED	.030***	-.56	.020**	.33	.031***	-.57			.010*	-.22	.041***	.18	.020**		-.43		
	QD	.012*	-.33	.041***	.45			.028***	.46			.103***	.27			.26		
	SS	.023**	.29	.013*	-.16					.025**	.21			.020**				
	HA	.016**	.26							.035***	-.11							
Functional age	ToW	.033**	–	.022*	–	.015	–	.025*	–	.026*	–	.057***	–	.011	–	.032**	–	.029**
	HL			.011*	.12			.011*	.13			.020**	.06					

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$;

Only significant betas of 'age' are shown.

 $\eta_p^2 = 0.01$ a small effect, $\eta_p^2 = 0.06$ medium effect, $\eta_p^2 = 0.14$ a large effect.

Associations between ToW and the different aspects of employability were analyzed in different models. Types of work schedule and the different operationalizations of ages were entered into the analysis at the same time.

^a=after log10transformation.

CAge=chronological age; OAge=organizational age; Ch=Children; ED=Emotional home demands; QD=Quantitative home demands; SS=social support at home; HA= Home Autonomy; HL= Healthy Lifestyle.

When *chronological age* was added to the analysis, differences were found between the types of work schedule for the following aspects of sustainable employability: general health, emotional exhaustion, work engagement, work-home interference and sickness absence duration. Chronological age explained a small part of the variance in general fatigue, work ability, emotional exhaustion, work-home interference, and episodes of sickness absence.

When *organizational age* was added to the analysis, differences were found between the types of work schedule for the following aspects of sustainable employability: general health, general fatigue, emotional exhaustion, work engagement, work-home interference, sickness absence episodes and duration. Organizational age explained only a small part of the variance in work ability and a modest part of the variance in sickness absence duration.

When *life-span age* was added to the analysis, differences were found between the types of work schedule for the following aspects of sustainable employability: general health, general fatigue, work engagement, work-home interference, sickness absence episodes and duration. Life-span age explained a medium to large part of the variance in health, general fatigue, work ability, emotional exhaustion, work engagement, work-home interference and job satisfaction, but not episodes of sickness absence and duration.

When *functional age* was added to the analysis, there was no change in the differences in aspects of sustainable employability between the types of work schedule. Functional age explained a small part of the variance in general fatigue, emotional exhaustion and work-home interference.

DISCUSSION

To our knowledge this is the first study to investigate differences between nurses who work in various types of work schedule regarding sustainable employability whilst also taking into account different operationalizations of nurses' age.

The differences found between the types of work schedule for aspects of sustainable employability were small to large and, for the greater part, related to the type of work schedule rather than age. Differences between the types of work schedule were found for general health, general fatigue, emotional exhaustion, work engagement, work-home interference, and sickness absence episodes and duration.

Especially nurses with a *type 1 schedule* (fixed early shift) showed the greatest contrast with nurses with a *type 3 schedule* (with a rotating three shift pattern). The latter can be considered as being 'worse off' concerning sustainable employability and are, in agreement with others, characterized by more negative features (3, 18, 30). Most likely, nurses move to less demanding schedules because of e.g. health problems, changing family responsibilities, or age, i.e. the so-called secondary selection (30, 62–65). From this viewpoint, nurses with a *type 1 schedule* are noteworthy. They can be considered as more advantaged with regard to sustainable employability, with higher

levels of health, lower work-home interference, less general fatigue, less emotional exhaustion, more work engagement and fewer episodes of sickness absence and shorter sickness absence duration. It is reported that transitions in work hours can indeed affect health positively (66, 67).

Although, in general, the type of work schedule is more important for sustainable employability than operationalizations of age, the present study shows the importance of including life-span age rather than chronological, organizational or functional age. No differences were found between the types of work schedule and work ability and job satisfaction. Work ability, emotional exhaustion and job satisfaction were only related to the life-span age and not to the types of work schedule. Chronological age and organizational age hardly explained differences in the aspects of nurses' sustainable employability between the types of work schedule. This is in line with Merkus et al. (25) who found that seniority was a poor proxy of shift work experience. Nurses' sickness absence duration, as well as episodes, differed between the types of work schedule and were only slightly related to chronological age and organizational age. These findings were in the expected direction (36, 68). Older chronological age was associated with less sickness absence episodes, whereas higher age of professionalism was associated with longer sickness absence duration. which is also in line with Thomson, Griffiths, and Davison (69). Differences between the types of work schedule regarding nurses' sickness absence and episodes were related to the types of work schedule and not to the life-span age. In line with other reports (70), life-span age is probably more a proxy of health than of sickness absence.

In our (mainly) female nursing population, life-span age, expressed by structural and psychosocial home characteristics, seems almost as important as the types of work schedule for sustainable employability, in particular for work ability, emotional exhaustion and job satisfaction. Decisions and choices around scheduling are influenced by family considerations and most often not by their own health and well-being, especially for workers with more extensive family responsibilities (71). Women are still more responsible for household and childcare than men (64) and relationships between life-span age and sustainable employability could be aggravated by gender differences and causes outside the workplace (72, 73). It could therefore be, that life-span age is more meaningful for women with respect to sustainable employability than for men (40).

Remarkably, having more children aged ≤ 12 years is related to better general health, less emotional exhaustion and less work-home interference. This might be explained by a protective effect: i.e. the combination of work and children may have enriched the working mother's health (74). An alternative explanation could be that having children invites employees to work fewer work hours (75, 76). Female nurses might prefer non-standard working hours as a conscious choice to arrange childcare in combination with the partners' job (64, 77). Indeed, additional analysis showed a negative correlation ($r=-0.39$; $p=0.000$) between the number of children aged ≤ 12 years and the number of hours worked. However, because the number of children and number of hours worked per week did not differ between the types of work schedule (29), this explanation seems

complex and needs more research to elucidate the cause and effect. Emotional and quantitative home demands were associated with lower sustainable employability, whereas home autonomy and more social support at home were associated with higher sustainable employability. The protective role of social support at home and higher home autonomy supports the value of the home as a resource (30, 70, 78).

Although less important than the types of work schedule, functional age (expressed by adherence to a healthy lifestyle) was associated with higher general fatigue, higher emotional exhaustion, and more work-home interference. It is possible that combining a healthy lifestyle, shift work and care, leaves no time for recovery after work, particularly when there is insufficient support at home or control over their work schedules (16, 79, 80).

Strengths and limitations

A positive point related to representativeness is that the characteristics of our participating nurses (besides the prevalence of types of work schedule) were similar to those of nurses working in comparable institutes in the Netherlands regarding age, sex, average work week, employment status and number of years in the current job (23). This similarity reduces the risk of unrepresentativeness. However, the prevalence of part-time work of other European countries, varies with the Netherlands as a leading country in part-time working (81). Therefore, extrapolation of our findings to European countries other than the Netherlands has to be made with care.

Due to the use of company registered sickness absence data, rather than of self-reported data, we tried to increase the validity and prevent our results from recall bias; this can be a problem when using self-reported sickness absence data concerning recall periods of longer than two months (82).

Although our non-respondents were slightly younger, it is difficult to evaluate whether this affected the associations found in the present study, because we have no information on the non-respondents' work schedules. Our findings might indicate a healthy worker effect (83). Since nurses in the type 1 shift are the eldest, but also seem to be the healthiest, nurses who 'could not stand the pressure' may have left the profession or moved from a demanding type of work schedule to a less demanding one (66). Due to the cross-sectional design of this study, we cannot rule out this effect. However, it could be assumed that in both ways it could have led to an underestimation of the associations between age and sustainable employability.

The average work week and overtime hours are representative for nurses in the Netherlands (24), and it seems unlikely that nurses execute a second job. However, it could be worthwhile to find out if the demands of a second job or informal care tasks deplete resources and decrease recovery and alter the observed associations between types of work schedule and sustainable employability.

Nurses with a permanent contract were slightly over-represented compared to the European countries. Contract type seems to moderate the relationship between job characteristics and sustainable employability and seems not directly related to sustainable employability (84, 85).

Although it was not the purpose of our study to test moderators of sustainable employability, this could have influenced the sustainable employability in our sample. Finally, we focused on the types of work schedules and various operationalizations of age in relation to sustainable employability. Although work demands and social support do not seem to differ when shift workers are compared to day workers (86, 87), we cannot explain differences in sustainable employability associated with other occupational factors such as higher levels of physical demands, emotional demands and management quality (73, 88) or that these occupational factors moderate the associations between the types of work schedule and sustainable employability (89).

CONCLUSIONS

This research offers insight into the differences between types of work schedule with regard to aspects of nurses' sustainable employability, and the complex relation with age. Nurses' sustainable employability appeared to be mainly related to differences between the types of work schedule rather than age. The life-span age also appeared to be important with respect to sustainable employability. Nurses working in different types of work schedule differ in age; however, chronological age and organizational age are hardly related to the differences in health, emotional exhaustion, work engagement, work-home interference and sickness absence duration found between nurses working in the different work schedules.

Practical and scientific implications

A system in which nurses with different types of work schedule are monitored in combination with their life-span perspective is important with respect to sustainable employability. Our new evidence-based typology of work schedules seems suitable and might help organizations to monitor aspects of sustainable employability of nurses working in different types of work schedule. Nurses with a type 3 schedule seem to require the most attention, a type 1 schedule could be offered as a 'temporary solution' for nurses with problems related to sustainable employability. Organizations should also be aware of the importance of the nurses' perception of home resources and demands, and should implement interventions to emphasize the life-span perspective of nurses with shift work.

In research, the types of work schedule should be taken into account.

Longitudinal research, preferably with a longer period (e.g. 10 years), is needed to examine the effect of types of work schedule and life-span age on sustainable employability. Furthermore, such studies should demonstrate which operationalization of age plays a role as an underlying mechanism for the career stage or choice of work schedule (38, 40). This is not only interesting for residential elder care, but also for other professions which have varying work schedules.

Conflict Of Interest

The authors declare that they have no conflict of interest.

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Which resources moderate the effects of demanding work schedules on nurses working in residential elder care? A longitudinal study.

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ABSTRACT

Background: Shiftwork is a major job demand for nurses and has been related to various negative consequences. Research suggests that personal and job resources moderate the impact of work schedules on stress, health and well-being. Objectives: This longitudinal study examined whether the interactions of personal and job resources with work schedule demands predicted work engagement and emotional exhaustion in nursing. Design: This longitudinal study included two waves of data collection with a one year follow-up using self-report questionnaires among 247 nurses working shifts or irregular working hours in residential care for the elderly in the Netherlands.

Methods: Moderated structural equation modelling was conducted to examine the interactions between personal and job resources and work schedule demands. Two work schedule demands were assessed: type of work schedule (demanding vs. less demanding) and average weekly working hours. Two personal resources, active coping and healthy lifestyle, and two job resources, work schedule control and the work schedule fit with nurses' private life, were assessed.

Results: Results showed that the work schedule fit with nurses' private life buffered the relationship between work schedule demands and emotional exhaustion one year later. Furthermore, the work schedule fit with nurses' private life increased work engagement one year later when work schedule demands were high. Work schedule control strengthened the positive relationship between work schedule demands and emotional exhaustion one year later. The personal resources, active coping and healthy lifestyle were no moderators in this model.

Conclusion: Nurses suffer less from decreasing work engagement and emotional exhaustion due to work schedule demands when their work schedules fit with their private lives. Work schedule control did not buffer, but strengthened the positive relationship between weekly working hours and emotional exhaustion one year later. Job resources appeared to be more important for nurses' well-being than personal resources. These findings highlight the importance of the fit of a work schedule with nurse's private life, if the work schedule is demanding.

INTRODUCTION

Shiftwork is a major job demand experienced by many nurses (1, 2). It has been related to negative consequences, such as burnout, health problems, decreased motivation, high turnover, decreased work ability, cardiovascular disease, problems with recruitment and retention (2-9).

Research suggests that personal resources, such as coping styles, good sleep quality and physical activity, moderate the impact of work schedules on stress, subjective health, cardiovascular disease and burnout (7, 10, 11). A cross-sectional study indicated that the fit of the work schedule with nurses' private life moderates the impact of work schedule demands on subjective health (12). Because it may be difficult to change work schedule systems, especially in the short term, another way to limit negative effects on health and well-being is to pinpoint the resources that help workers tolerate demanding schedules (2, 8, 13). However, research on how personal and job resources moderate the negative effects of work schedule demands is scarce (11).

Work schedule demands in nursing

This study concentrates on the specific demands of work schedules and its effect on emotional exhaustion and work engagement. Job demands refer to those physical, psychological, social or organizational aspects of work that require sustained physical or psychological (cognitive and emotional) effort or skills. They may turn into stressors when poorly designed jobs or chronic job demands (e.g. work overload, emotional demands) exhaust employees' mental and physical resources, leading to the depletion of energy and, in turn, health problems such as emotional exhaustion. Although there is debate about which work schedules cause more negative consequences, rotating three-shift systems, irregular schedules and nightshifts have been found to have more negative consequences than other work schedules (5, 14-16). Another important work schedule demand is the duration of working hours (17). Long working hours are positively related to negative mental and physical health indicators (17-22).

Personal and job resources

Given that work schedules are an on-going source of stress, personal and job resources can be expected to buffer the negative effects of work schedule demands on health (23-26). According to the Conservation Of Resources (COR) theory, resources are entities that have intrinsic or instrumental value, including objects, conditions, personal resources, and energy resources (27). Job resources are those aspects of work that facilitate the achievement of goals and minimize the effects of job demands. They are functional in accomplishing work goals, and stimulate personal growth and development (28). Personal resources are aspects of the self that are generally linked to resilience. They pertain to individuals' ability to control and influence their environment successfully, especially during challenging circumstances (29). Resources seem to particularly influence work engagement

when demands are high (28). There is evidence that the above mentioned resources are especially effective in protecting employees from the adverse effects of stressors when they are matched to the specific stressor (30, 31). For example Zacher et al. (31) found that employees' satisfaction with eldercare tasks buffered the negative relationship between demands and work performance. However, research on the effect of the interaction between work schedule demands and personal and job resources in relation to work engagement and burnout is scarce and longitudinal research is particularly needed (11, 13, 32).

Personal resources in nursing

In view of the specific demands of shift work, this study focuses on active coping and on healthy lifestyle as personal resources. There is considerable variability in the extent to which individuals adapt to shiftwork (33). There are indications that personal resources of a more practical behavioural nature can be expected to moderate the negative consequences of work schedule demands (11, 34-36).

Coping refers to behavioural and cognitive efforts to manage situations that are perceived to tax personal resources. Active coping, conceptualized as behaviour aimed at addressing problems at work by cognitively analysing the situation or by taking action to solve or overcome the problem (37). Active coping is a key personal resource in COR theory as it reflects aspects of the self that are generally linked to resilience (38). Active coping has been found to protect against burnout among nurses (39-42) and has also been found to moderate the negative health effects of job demands on dimensions of burnout (39, 41).

Healthy lifestyle is a collective pattern of health-related behaviour (25, 43) and is in line with the common sense idea that a healthy life is linked to resilience (44). It can be defined as personal behavioural resource and includes adherence to adequate physical activity, abstinence from smoking, consuming limited or no alcohol, and healthy eating (45). In this study, quality of sleep was added as an indicator of shiftworkers' capacity to adapt their behaviour to the demands of their work schedule. Adherence to a healthy lifestyle, according to some authors (11, 46), should be expected to moderate the effects of work schedule demands on health and may act as a personal resource (47-49) in three ways. First, it may improve health, thereby enhancing employees' resilience and capacity to manage stress. Second, it may reduce the physiological arousal that typically occurs in stressful situations. Third, it may encourage relaxation either during or shortly after psychological and physiological arousal, thereby preventing a build-up of tension. Cross-sectional studies among nurses, and longitudinal studies among other occupational groups, show positive relationships between healthy lifestyle factors and less fatigue, less psychological distress, higher work performance and higher mental health (8, 45, 50-52). To date, there has been no published research focusing on the interaction between work schedule demands and healthy lifestyle in nursing.

Job resources in nursing

Jobs can offer resources to nurses to assist them to withstand work schedule demands. This study focuses specifically on two job resources, work schedule control and the work schedule fit with the nurses' private life.

Work schedule control (WSC) refers to the worker's ability to influence the duration, timing, and distribution of working hours (53). Perceived control is a resource that can diminish the impact of the work schedule on mental health and burnout, especially for female employees (36, 54-57). In a large prospective cohort study of health care workers, the combination of shiftwork and moderate or low control over working time was associated with less vitality, worse mental health, and more somatic stress compared to high control over working time (58).

Another aspect of the job concerns the extent to which the work schedule fits with nurses' private life, particularly in relation to leisure time, family and social circumstances, sleep and work-leisure time balance (34, 59). This appeared to be an important concept. Peters et al., (12) found indications that the extent to which the work schedule fits with nurses' private life moderated the relationships between work schedule demands and both emotional exhaustion and health complaints. The extent to which their work schedule fits with private life is not only related to objective characteristics, such as duration of work and flexitime, but also to positive and negative consequences (6, 56). A large study among European nurses, the Nurses' Early Exit Study (NEXT study), indicated that it was not the work schedule itself, but rather the discrepancies between individuals' wishes and the schedule, that affected turnover intention (60) and highlighted the positive aspects of the work schedule in relation to the private life.

Burnout and work engagement

Burnout is a unique type of stress syndrome that includes emotional exhaustion, depersonalization (or cynicism), and diminished personal accomplishment (39, 61). Work engagement is a positive, work-related state of fulfilment that is characterized by vigour, dedication, and absorption (62). According to Bakker, Schaufeli, Leiter, and Taris (63), it can be seen as the opposite of burnout. Emotional exhaustion, the main dimension of burnout (64-66) and vigour are opposite ends of the energy dimension of work engagement, while cynicism and dedication are opposite ends of an underlying attitudinal dimension (67). The inclusion of work engagement reflects the growing interest in the benefits of work and not just in its negative effects.

The research model

It is widely assumed that shiftwork contributes to stress reactions and negative health effects in a comparable way to other occupational stressors and processes (26, 53, 68). A considerable number of theories about work-related stressors and health have been developed in the past. In these models, causes and outcomes are more or less conceptually integrated and ordered

into a causal pattern of relationships. A well-known example is the Job Demand-Control model (69). The most innovative aspect of this model was that psychological strains were considered a consequence of the interaction effects of job demands and job control. More recent developed models emphasize, merely build upon the COR theory, not only the effect of demands but also of resources on health effects, e.g. the Job Demand-Resources model (JD-R). According to this JD-R model, each occupation has its own specific risk factors associated with job-related stress and can be applied to various occupational settings, irrespective of the particular demands and resources involved (70). Elaborating on this JD-R model, we stated the following research model for studying the moderation effects of personal and job resources (24, 29, 71). Resources are assumed to buffer the impact of job demands on job strain, including burnout. The interaction of job demands and resources affects engagement and burnout (24, 28). Hobfoll et al. (29) propose that resources are particularly used when demands are high.

The present study aims to identify and understand the role of these resources in order to develop or provide input for interventions to enhance nurses' work engagement and to prevent burnout.

In line with the theoretical and empirical findings above, the following hypotheses were formulated (and incorporated in the research model, see Figure 1).

- Hypothesis 1:* Work schedule demands predict higher emotional exhaustion.
- Hypothesis 2a:* Personal resources predict greater work engagement.
- Hypothesis 2b:* Job resources predict greater work engagement.
- Hypothesis 3a:* Personal resources buffer the relationship between work schedule demands and emotional exhaustion.
- Hypothesis 3b:* Job resources buffer the relationship between work schedule demands and emotional exhaustion.
- Hypothesis 4a:* Personal resources particularly predict work engagement under conditions of high work schedule demands.
- Hypothesis 4b:* Job resources particularly predict work engagement under conditions of high work schedule demands.

Figure 1: Research model (numbers refer to the hypotheses).

METHOD

Design, population and procedure

This longitudinal study included two waves of data collection using self-report questionnaires. The participants were nurses who worked on shifts or irregular working hours in residential care for the elderly, which accommodates clients with psycho-geriatric disorders and physical frailties. The three facilities that participated were included because the nurses' work schedules generally reflected nursing work schedules in the Netherlands. Questionnaires were sent to the home addresses of all nursing employees. The participants were asked to return them within two weeks. Reminders were sent to all participants two and three weeks after the initial distribution of the questionnaires. The two waves of data collection were one year apart (October 2009 and October 2010). This period was chosen because it was long enough to measure possible changes in individual scores and also to control for seasonal effects (72, 73). The study was not submitted to an ethical committee because, according to Dutch law (Wet Medisch-Wetenschappelijk Onderzoek met Mensen/Medical Research Involving Human Subjects Act), surveys only have to be submitted to an ethical committee in a limited number of situations, and does not apply to the present study. The study was approved by the management board of the homes involved. The participants were informed by individual letter and an institutional newsletter, they were free to refuse to participate and welcomed to ask questions and express concerns about the study any time. The questionnaires contained a code to identify participants the second time. Only an anonymous code remained in the final dataset.

Return of a completed questionnaire was taken to imply consent. Data were stored anonymously, treated confidentially and the participants' privacy was guaranteed.

Sample

The total study population comprised 974 nurses who worked shifts and were employed in one of the three participating facilities. Although 'nurse' indicates normally the qualification level of a registered nurse, the current research uses this term for nurses working in residential elder care in the Netherlands. This includes registered nurses, enrolled nurses, licensed vocational or practical nurses and nurse care helpers. In the Netherlands nurses working in residential elder care are comparable with respect of qualification level to Dutch nurses working in hospitals, home care, care for disabled people and mental health care but do have different psychosocial and physical demands (74). The proportion of registered nurses working in residential elder care varies between European countries with the Netherlands as a leading country with the highest proportion of registered nurses working in residential elder care (60). At Time 1, 498 questionnaires (51%) were returned (see Figure 2). At Time 2, 291 questionnaires (58%), and 30% of the initial study population) were returned. Only fully completed questionnaires were analysed.

Figure 2: Flowchart of inclusion process and t-tests between respondents and non-respondents.
#=percentage of 36 fulltime work hours per week
p* <.05. *p* <.01. ****p* <.001.
WSF= Work schedule fit with private life; WSC= work schedule control.

Measures

Demands

To collect data on the characteristics of their work schedules, respondents were asked which shifts they worked (morning, afternoon and night shifts) and when these working days began and ended. They were also asked whether they worked shifts other than these standard morning, late and night shifts. Based on a new typology (75, 76) of work schedules, the schedules were initially classified into five types. LISREL (Linear Structural RELations, a statistical software package used for structural equation modeling) cannot deal with nominal data because it needs correlations to produce a variance-covariance matrix. Therefore, the schedules were subsequently classified into two types: a rotating schedule including morning, afternoon and night shifts (scored 1) and all other work schedules (scored 0). The second work schedule demand was the average number of weekly working hours, which was assessed with the following item: "How many hours are you contractually required to work each week?"

Personal resources

Two personal resources were assessed: active coping and adherence to a healthy lifestyle. Active coping style was assessed using the subscale of the Utrecht Coping List (short version) (77). This subscale assesses a direct and logical approach to problematic situations. It consists of five items that are scored on a 4-point Likert scale, ranging from 0 'seldom or never' to 3 'very often'. Participants are asked to indicate how often they cope with problems and stressful situations in the way described by each item, for example by 'Acting immediately when problems occur'. A higher score reflects a more active coping style. The internal consistency (Cronbach's alpha) was 0.76 at T1.

Healthy lifestyle was measured with a composite scale composed corresponding to the procedure used by Pronk et al. (45, 78) that provided information about five behaviours: physical activity, smoking, alcohol use, consumption of fruit or vegetables and quality of sleep. It provides an "optimal lifestyle index" (45). This optimal lifestyle index has shown to have sufficient construct validity and to be related to job and health related outcomes (45, 78-81). Each behaviour was classified as a binary variable. Meeting the norm for each behaviour was scored '1' and not meeting it was scored '0'. Scores were summed to form a lifestyle index that ranged from 0 'low adherence' to 5 'high adherence', which reflected the healthiest lifestyle. The following behaviours were used:

- In accordance with the Dutch Standard for Healthy Exercise, physical activity was assessed as the number of days in a usual week that the nurse engaged in vigorous or moderate intensity activities (Kemper et al., 2000). The criterion was met if nurses engaged in ≥150 minutes per week of moderate physical activity or engaged in ≥60 minutes per week of vigorous activity.
- Smoking was assessed with the question "Do you smoke?".

- Alcohol consumption was assessed using the average number of alcohol drinks per week. The criterion was met if women drunk not more than 7 units and if men drunk not more than 14 units of alcohol per week (82).
- Fruit and vegetable consumption was assessed by asking on how many days in a typical week more than 200 grams of fruits and vegetables were consumed. The criterion was met if seven days per week for both fruit and vegetables were consumed.
- Quality of sleep was assessed with the sleep quality scale in the Dutch Quality of Work Questionnaire [*Vragenlijst Beleving en Beoordeling van de Arbeid (VBBA)*], which contains 14 items, such as: "When I wake up in the night, it is hard for me to fall asleep again". Each item was scored as either 'yes' or 'no' and they were then averaged, with a higher score indicating more sleep complaints. The internal consistency (Cronbach's alpha) was 0.88. The median split method ($Med = .21$) was then used to dichotomize this scale into high sleep quality and low sleep quality.

Job resources

Two job resources were assessed: work schedule control and the work schedule fit with nurses' private life.

Work schedule control (WSC) was measured with a scale that assesses perceptions of having choice and influence over starting and ending times, days off, breaks during the workday, swapping shifts and taking unpaid leave. It consisted of 10 items scored with either 1 ('yes') or 0 ('no') (76). Example items are: "Does your roster have a fixed pattern?" and "Is it easy to swap shifts?" The internal consistency (Cronbach's alpha) was 0.61 at T1, which was not increased by deleting items.

Satisfaction with Irregular Working hours (SIW) (59) was used to measure the extent to which the work schedule fits with nurses' private life, particularly in relation to leisure time, family situation, social circumstances, sleep and work-leisure time balance. The scale consists of fourteen items that are scored on a 5-point response scale ranging from 1 'entirely dissatisfied' to 5 'entirely satisfied', for example: 'How satisfied are you with the quality of your contact with family, friends and spouse given your irregular working hours?' The internal consistency (Cronbach's alpha) was 0.93 at T1.

Outcome variables

Emotional exhaustion was measured using a subscale of the Dutch version of the Maslach Burnout Inventory-General Survey (61). Emotional exhaustion seems the most characteristic burnout dimension in general and in nursing (64-66). The Maslach scale contains five items that are scored on a 7-point response scale ranging from 0 'never' to 6 'always'. An example of the items is "Working all day is really a strain for me". The internal consistency (Cronbach's alpha) was 0.90 at T1 and 0.91 at T2.

Work engagement was used to assess positive consequences. It was measured with the short version of the Utrecht Work Engagement Scale (UWES-9). It measures a positive, work-related state of fulfilment that is characterized by vigour, dedication and absorption (83). It consists of nine items and has been found to be reliable and valid (83). Participants responded on a seven-point Likert scale, ranging from 'never' (0) to 'always and daily' (6), with higher scores indicating greater work engagement. Examples of items are: "At my work I feel bursting with energy" (vigour), "My job inspires me" (dedication) and "Time flies when I am working" (absorption). The internal consistency (Cronbach's alpha) was 0.92 at T1 and T2.

Data analyses

The data were analysed in three steps. First, participant attrition was investigated by examining the differences in means or medians between participants in the panel group and those who participated the first time, but not the second (see Figure 2). Second, preliminary analyses (means, standard deviations, Cronbach's alphas, correlational analyses) were conducted. Third, the study hypotheses were tested in LISREL 8.8 using moderated structural equation modelling and the maximum likelihood method (84, 85).

Because it is difficult to interpret multiplicative interaction terms in longitudinal research (86, 87) an incomplete two-wave panel design was used (73). The moderated SEM analyses followed the procedure described by Cortina, Chen and Dunlap (88) and used by Bakker, Hakanen, Demerouti, and Xanthopoulou (89). For each hypothesized interaction effect, a model was tested that included three types of exogenous variables: 1) type of work schedule or hours worked; 2) personal and job resources and 3) the multiplicative terms. Two endogenous variables were included (emotional exhaustion and work engagement at Time 2). To partial out their effects, the two outcome variables at Time 1 were included (cf. 73). In total, eight different models were tested for each possible interaction. Based on modification indices, the latent variable, emotional exhaustion at T2, loaded on the indicator variable, vitality at T2, which is also supported by theory (see 90). Figure 3 shows an example of the model that was applied separately for each of the four job resources.

Each exogenous variable had only one indicator according to the procedure described by Cortina et al., (88). The indicator of the latent interaction variable was included in the model by performing two analytic steps (91): (1) the variables were standardized to prevent multi-collinearity, and (2) the multiplicative terms of the demands and resources were computed from these variables.

The models included direct paths from the five exogenous variables to the two endogenous variables. The demands and resources variables were allowed to correlate, whereas correlations between demands and resources and the interaction term were constrained to zero. The residual errors of the two outcome variables were also allowed to correlate. Finally, the paths from the latent exogenous factors to their indicators were fixed with the square roots of the scale reliabilities, whereas the error variances of each indicator were set equal to the product of their variances and

one minus their reliabilities. Manifest indicators of the two outcome variables at Time 1 were not used to completely comply with the Cortina procedure (88) and prevent identification problems. For a more detailed description of the calculation of the reliability score for the interaction term, see Cortina et al. (88). According to MacCallum, Browne and Sugawara (92), the estimated power for exact fit was $>.70$ and for a more realistic close fit $>.95$ ($df=37$, $n=247$).

Several commonly-used fit indices were employed to assess the overall model fit (84, 85): the chi-square statistic (χ^2), the goodness-of-fit index (GFI), and the root mean square error of approximation (RMSEA). Finally, t -values were used to assess the significance of specific relationships.

A significant interaction effect is evident when the path coefficient from the interaction variable to the endogenous variables is statistically significant. To confirm this, the models were tested with and without the path from the latent interaction variable to the endogenous variables and the two models were compared on the basis of the chi-square difference statistic (87, 88). To examine the nature of the significant interaction terms, they were graphically displayed according to the method proposed by Aiken and West (91).

Figure 3: The analytical model.
WE=Work Engagement, EE=Emotional Exhaustion, Ded=dedication, Abs=absorption, Vit=vitality, PR=Personal Resource, JR= Job related resources, WSD=Work Schedule Demands, WSDxPR-JR=Interaction Work Schedule Demands and Personal or Job related Resource, T1=Time 1, T2=Time 2.

RESULTS

The final panel group ($n=247$), consisting of participants who responded at both Time 1 and Time 2, comprised mainly women (96.7%), which is typical for residential health care in the Netherlands. The mean age of the respondents at Time 1 was 43.04 years ($SD=11.6$). Fifteen respondents (6.2%)

had full-time contracts (36 contractual work hours a week), 43 (17.8%) reported contractual working hours between 30 and 35 hours per week, 70 (28.3%) between 24 and 30 hours and the remaining 119 (47.7%) nurses worked 24 hours or less. The average period of employment in the current job was 9.4 years ($SD = 8.0$). Intermediate vocational education was the most common educational level (level 6; 63.6%). One hundred and forty-nine participants (60.8%) had children living at home and 32.8% had children below the age of twelve. The average number of night shifts per month among the 48.5% of the respondents who worked nights was 4.4 ($SD = 4.85$). The average number of weekend shifts per month of the 95.1% of nurses who worked weekends was 4.1 ($SD = 1.90$). Correlational analyses showed that these background variables were only marginally related to the model variables and to the type of schedule (Table 1). Consequently, they were excluded from all further analyses.

Descriptive statistics

Table 1 shows the means, standard deviations, correlations, and internal consistencies (in the diagonal) of all variables in this study.

Table 1: Means, Standard Deviations, Internal Consistencies (Cronbach Alphas on the Diagonal), and correlations between the study variables ($N = 247$).

	M/(M _d)	SD	1	2	3	4	5	6	7	8	9	10	11	12
1 Age T1	43.04	11.7	(n.a.)											
2 Education T1	6	-	-.155*	(n.a.)										
3 Type of schedule T1 1=type 3; 0=others	0	-	-.293**	.095	(n.a.)									
4 Weekly working hours T1	22.0	8.85	.120	-.022	.296**	(n.a.)								
5 Active coping T1	1.9	0.42	-.080	.054	-.005	.046	(0.76)							
6 Healthy lifestyle T1	3.0	1.00	.024	-.007	-.169**	-.074	.150*	(n.a.)						
7 Work schedule control T1	0.4	0.22	.066	-.080	-.100	-.221**	-.024	-.009	(0.61)					
8 Work schedule fit with private life T1	3.6	0.60	-.021	-.040	-.185**	-.191**	-.039	.121	.313**	(0.93)				
9 Work engagement T1	4.6	0.92	-.050	-.102	.080	.162*	.282**	.164**	.189**	.022	(0.92)			
10 Emotional exhaustion T1	1.9	1.23	.085	-.140*	.154*	.046	-.360**	-.162*	-.127*	-.037	-.218**	(0.90)		
11 Work engagement T2	4.4	0.93	-.114	-.138*	-.040	.033	.318**	.177**	.138*	.031	.600**	-.224**	(0.92)	
12 Emotional exhaustion T2	2.0	1.28	.138*	-.150*	.227**	.047	-.376**	-.171**	-.067	-.001	-.099	.574**	-.339**	(0.91)

* $p < .05$. ** $p < .01$. *** $p < .001$.

The two work schedule demands (variables 3 and 4) were at best weakly correlated with the personal and job resources (variables 5 to 8) and work engagement and emotional exhaustion at T1 and T2

(variables 9 to 12). Similarly, except for satisfaction with irregular working hours, the personal and job resources variables were at best weakly correlated to work engagement and emotional exhaustion. Of all the correlations between personal and job resources, only the inter-correlation between satisfaction with irregular working hours and work schedule control was moderate; the other variables were correlated weakly or not at all. Work engagement at T1 and T2 was strongly correlated, as was emotional exhaustion at T1 and T2. There were only weak negative correlations between work engagement and emotional exhaustion at T1 and at T2.

Inferential statistics

Tables 2 and 3 show the results of the MSEM analyses.

Table 2: Results of Moderated Structural Equation Modeling: Interactions of type of work schedule and resources (N =247)

Predictor	Emotional exhaustion (EE)T2		Work engagement (WE) T2		Fit measures				
	UPC	t=	UPC	t=	Chi2	df	p=	GFI	RMSEA
Type of work schedule	.03	.94	-.06	-1.61	60.8	37	.008	.96	.051
Active Coping	-.02	-.56	.03	.60					
Type of work schedule x Active Coping	-.07	-1.63	-.01	-.19					
Work engagement T1			.48	10.36***					
Emotional exhaustion T1	.44	9.19***							
R ²	.38		.42						
Type of work schedule	.03	.80	-.06	-1.58	54.0	37	.035	.97	.043
Healthy Lifestyle	.13	.49	-.06	-.33					
Type of work schedule x Healthy Lifestyle	-.05	-1.33	.03	.67					
Work engagement T1			.49	8.68***					
Emotional exhaustion T1	.45	7.17***							
R ²	.40		.45						
Type of work schedule	.03	.76	-.05	-1.41	54.0	37	.035	.97	.043
Work schedule control	.00	.07	.03	.54					
Type of work schedule x Work schedule control	-.05	-1.13	.08	1.65					
Work engagement T1			.47	9.89***					
Emotional exhaustion T1	.42	8.96***							
R ²	.37		.43						
Type of work schedule	.03	.73	-.06	-1.42	62.2	37	.005	.96	.054
Work schedule fit with private life	-.12	-2.86*	.10	2.17*					
Type of work schedule x Work schedule fit with private life	-.09	-2.35*	.09	2.23*					
Work engagement T1			.48	9.18***					
Emotional exhaustion T1	.38	7.90***							
R ²	.41		.44						

UPC = unstandardized path coefficient; GFI = goodness-of-fit index; RMSEA =root-mean-square error of approximation; ΔChi^2 = Chi²difference test of the model without the interaction term.

* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 3: Results of Moderated Structural Equation Modeling: Interactions of hours worked and personal resources (N =247)

Predictor	Emotional exhaustion T2		Work engagement T2		Fit Measures				
	UPC	t=	UPC	t=	Chi2	df	p=	GFI	RMSEA
Hours worked per week	.09	2.46*	-.05	-1.30	56.2	37	.022	.97	.046
Active Coping	-.01	-.14	.03	.70					
Hours worked per week x Active Coping	.04	.86	.03	.57					
Work engagement T1			.47	10.30***					
Emotional exhaustion T1	.42	8.82***							
R ²	.39		.42						
Hours worked per week	.14	1.00	-.08	-.65	50.9	36	.051	.97	.041
Healthy Lifestyle	.07	.42	-.03	-.26					
Hours worked per week x Healthy Lifestyle	.04	1.07	-.01	-.28					
Work engagement T1			.48	8.76***					
Emotional exhaustion T1	.42	8.94***							
R ²	.40		.41						
Hours worked per week	.09	2.38*	-.05	-1.39	54.0	37	.035	.97	.043
Work Schedule Control	-.01	-.29	.03	.69					
Hours worked per week x Work schedule control	.10	1.98*	.03	.52					
Work engagement T1			.46	9.66***					
Emotional exhaustion T1	.41	8.70***							
R ²	.41		.41						
Hours worked per week	.12	1.04	-.10	-.65	48.8	34	.048	.97	.042
Work schedule fit with private life	.01	.13	-.03	-.23					
Hours worked per week x Work schedule fit with private life	-.10	-2.39*	.10	2.10*					
Work engagement T1			.48	6.70***					
Emotional exhaustion T1	.38	8.33***							
R ²	.44		.46						

UPC = unstandardized path coefficient; GFI = goodness-of-fit index; RMSEA =root-mean-square error of approximation; ΔChi^2 = Chi²difference test of the model without the interaction term.

* $p < .05$. ** $p < .01$. *** $p < .001$.

Direct Relationships (hypotheses 1 and 2)

Overall, the RMSEA and GFI indicated good model fit. Both work engagement and emotional exhaustion at T1 were strongly and positively related to work engagement and emotional exhaustion at T2. Working in a specific type of work schedule did not predict work engagement or emotional exhaustion at T2. Weekly working hours predicted emotional exhaustion at T2 positively in two models: the more hours nurses worked at T1, the more emotionally exhausted they were at T2. Of the personal and job resources, only satisfaction with irregular working hours confirmed our hypothesis and predicted work engagement and emotional exhaustion at T2. This implies that hypotheses 1 and 2b were both partially supported.

Interactions between work schedule demands and personal and job resources (hypotheses 3 and 4)

The results of the MSEM analyses provided support for the interactions between work schedule control and weekly working hours and satisfaction with irregular working hours and both work schedule demands. Work schedule control did not buffer, but reinforced the effect of weekly working hours on emotional exhaustion; the effect of weekly working hours on emotional exhaustion was the strongest when work schedule control was high. Satisfaction with irregular working hours buffered the effect of the type of work schedule and weekly working hours on emotional exhaustion. Satisfaction with irregular working hours predicted work engagement when the type of work schedule and weekly working hours were demanding.

In a final step, suggested by Cortina et al. (88), the model was tested without the paths from the interaction terms to work engagement and emotional exhaustion (T2), allowing a Chi2-difference test in fit between the model with and without the paths. In all five cases, elimination of the paths resulted in a significant chi-square difference test ($p < .05$; $df = 1$), indicating that the models without the path from the latent interaction variable to the endogenous variables had a significantly worse fit. These findings further supported the interaction effects.

To test hypothesis 3b in more detail, figure 4 shows a graphical representation (91) of the significant effect of weekly working hours on emotional exhaustion at T2 within high (+1SD) and low (-1SD) work schedule control subgroups. An increase in hours worked each week caused higher emotional exhaustion at T2 when work schedule control was high (+1SD) compared with when work schedule control was low (-1SD). To further test hypothesis 3b in more detail, figures 5 and 6, show a graphical representation (91) of the significant buffer effect. The buffer interactions showed a similar pattern. For nurses with high work schedule demands (type 3 schedule) (Figure 5), low satisfaction with irregular working hours (-1SD) caused higher emotional exhaustion at T2 compared with nurses with high satisfaction with irregular working hours (+1SD). An increase in hours worked each week (Figure 6) caused higher emotional exhaustion at T2 when satisfaction with irregular working hours was low (-1SD) compared with when satisfaction with irregular working hours was high (+1SD).

Figure 4: Work schedule control (WSC) moderates the effect of hours worked each week on emotional exhaustion on T2

Figure 5: The work schedule fit with private life (WSF) buffers effect of type of schedule (ToS) on emotional exhaustion on T2

Figure 6: The work schedule fit with private life (WSF) buffers effect of hours worked each week on emotional exhaustion on T2

To test hypothesis 4b in more detail, Figures 7 and 8 show a graphical representation of the significant interaction effects; the effect of resources on work engagement at T2 within high (+1SD) and low (-1SD) work schedule demands subgroups. These interactions showed similar patterns. Satisfaction with irregular working hours (Figure 7) caused higher work engagement at T2 for those with high work schedule demands (type 3 schedule) compared with those with low work schedule demands (all other types of work schedule). Satisfaction with irregular working hours caused a higher work engagement at T2 when the hours worked weekly were high (+1SD), compared with when the hours worked weekly were low (-1SD) (Figure 8).

Figure 7: Type of schedule (ToS) moderates the effect of the work schedule fit with private life (WSF) on work engagement on T2

Figure 8: Hours worked per week moderates the effect of the work schedule fit with private life (WSF) on work engagement on T2

DISCUSSION

This longitudinal study of nurses working in residential care for the elderly examined whether personal and job resources moderate the relationships between work schedule demands and two work related health outcomes: work engagement and emotional exhaustion. Generally, few interaction effects were found. However, the extent to which the work schedule fits with nurses' private life appeared to enhance resilience to the two work schedule demands. With respect to the hypotheses about direct longitudinal effects (Hypothesis 1, 2a and 2b), only weekly working hours at Time 1 were related to greater emotional exhaustion one year later. The work schedule fit with nurses' private life and work schedule control were both associated with work engagement in an earlier study (12). However, in the present study, the work schedule fit with nurses' private life was the only job resource directly linked to work engagement one year later. This result could be partially explained by statistical power. Work engagement and emotional exhaustion at Time 1 were included to correct for stability effects and explained between 37% and 48% of the variance in work engagement and emotional exhaustion at T2.

Hypothesis 3b, concerning the buffering effect of job resources, was partially confirmed. The work schedule fit with nurses' private life buffered the relationships between the type of work schedule and weekly working hours on the one hand and emotional exhaustion one year later on the other. Consistent with the hypothesis, a demanding work schedule, the rotating three shift schedule and longer weekly working hours were associated with more emotional exhaustion when the work schedule fit with nurses' private life was low. The work schedule fit with of one's private

life appeared to be particularly relevant when demands were high. These findings are in line with the buffering hypothesis in the JD-R model (28) and the Demand-Induced Strain Compensation (DISC) model (93). They are also consistent with the proposition that resources are most effective when they are closely matched to the specific stressor (30). Nurses' work schedule fit with their private life seems an important buffer of negative effects of work schedule demands; that is, the number of weekly working hours and the type of work schedule. Previous research suggests that perceived fit between the work schedule and social time with family is a valuable resource for nurses (11, 94).

Hypothesis 4b, concerning the effect of the interaction between work schedule demands and job resources on work engagement one year later, was confirmed. These findings imply that a work schedule that fits with nurses' private life results in higher work engagement, especially when work schedule demands are high. In line with COR theory (95) and for example the JD-R model (28, 89), it indicates that work schedules that fit nurses' private life assists nurses to deal with high work schedule demands. They are likely to use their non-work time for recovery, for example by taking part in social or active leisure activities. This study indicated that a work schedule that fits with their private life is less important with respect to work engagement when the work schedule demands are low.

Hypothesis 3b, regarding the buffering role of the work schedule fit with nurses' private life, was also supported. The effect of the interaction of work schedule control and weekly working hours on emotional exhaustion one year later was surprising. The relationship between weekly hours and higher emotional exhaustion was strongest when nurses reported high work schedule control. However, previous studies also reported inconsistent findings regarding control (89, 96, 97). It is possible that nurses may perceive a greater ability to schedule their own work as an extra burden rather than a resource, especially in a profession where starting and ending times are static and collaboration with colleagues is necessary to swap work schedules (97). This interpretation is consistent with a former study by Peters et al. (12) in which nurses with higher perceived work schedule control reported more health complaints than those with lower work schedule control. More work schedule control could also be linked to more home or family related demands (98). In a working population consisting mainly of women, traditionally the caregivers, this could lead to more various forms of domestic care, such as care responsibilities rather than increased capacity to recover and manage existing work and family demands (99, 100). An alternative explanation for these findings could be that work schedule control interacts with other job resources. De Rijk et al. (39) showed that a three-way interaction of job demands, job control and active coping affected emotional exhaustion. Only nurses with high active coping seemed to benefit from job control in that study. This three-way interaction could not be tested in our study using the moderated SEM analyses according to the procedure described by Cortina et al., (88). Although De Rijk et al. in their study used a more generic form of job control, it is possible that nurses with a more active

coping style actively use their work schedule control to swap shifts or use breaks for activities that aid recovery, such as exercise.

Hypotheses 3a and 4a were not confirmed. Although active coping is generally seen as an effective way to deal with job demands (37), no direct or buffering effect was found in this study, supporting other longitudinal findings (40, 101). Regarding hypothesis 4a there was no relationship between healthy lifestyle and work engagement and the interaction between the two did not affect the outcome variables. It is difficult to compare these results with other empirical findings because operationalizations of lifestyle vary widely. Nevertheless, there are some possible explanations. First, the one-year interval between Time 1 and Time 2 in this study was probably not sufficient to affect work engagement. No effects were found from a combined lifestyle program in a RCT on vitality, work engagement, productivity, and sick leave after 6- and 12-months (102), but physical activity can attenuate burnout and depression in the long run (103). Second, individual health-related behaviours, such as smoking, physical activity and alcohol abuse, have been found to have their own specific (time related) effects on health, disability pension and cardiovascular disease (104, 105), implying that a healthy lifestyle attributes more to physical health than to work engagement. Thirdly, there is a possibility that nurses' work engagement leads to health-related behaviour instead of the other way around. In cross-sectional research the degree of adherence to optimal lifestyle is associated with positive performance, general health and mental health (45, 51, 106). Engaged nurses may be more proactive and take opportunities to pursue a healthy lifestyle. However, due to the incomplete panel design, it is not possible to prove reversed causation effects (107).

Limitations of the study

Some limitations of the present study should be noted. Although the variables under examination did not differ significantly between the respondents and non-respondents, non-respondents were slightly younger. The effect size was small ($d=0.29$), but this could indicate non-response bias. On the other hand, there was positive evidence regarding representativeness. The respondents' age, sex, average weekly working hours and number of years in their current jobs were similar to those of nurses working in comparable facilities in the Netherlands (108).

A second limitation is that self-report measures were used. However, the bivariate correlations were not unusually high, different scale ranges were used, Harman's single factor test did not explain a large portion of variance (31%) and the results of controlling for the effects of an unmeasured latent methods factor in Lisrel (109) suggest that common method variance is not a serious threat to the findings. Nevertheless, in future studies it may be valuable to include more objective outcome variables, such as registered sick leave data.

An explanation for the relatively small number of direct cross-lagged relationships and interaction effects may be found in the statistical technique that was used. The cross-lagged effects might have been underestimated because of correction of stability effects and because of the time lag

used (107). Emotional exhaustion and work engagement have been shown to be stable across long periods (110, 111).

The scales generally showed good reliability. The work schedule control scale had just sufficient internal consistency at T1 ($\alpha = .61$) even though there is evidence it has good construct validity and it measures schedule control in accordance with findings of Nijp and colleagues (112). The implications of this limitation for the present findings are unclear, but might have led to underestimation of interaction effects. Furthermore, studies to further test the reliability and validity of the healthy lifestyle index are necessary.

CONCLUSION AND IMPLICATIONS

This study shows that when nurses report that their (irregular) work schedules fit with their private lives, they suffer less from decreasing work engagement and emotional exhaustion due to work schedule demands. The work schedule fit with nurses' private life, a job resource more proximal to work schedules appeared to be more important for nurses' wellbeing than personal resources that were more distal. The other job resource examined, work schedule control, and the personal resources, active coping and healthy lifestyle, did not buffer the negative effects of work schedule demands. Moreover, nurses who experienced more work schedule control showed higher emotional exhaustion when weekly working hours were high.

The present findings have implications for future research and practice. More longitudinal research should be conducted on the potential interaction effects of job resources and work schedule demands on work engagement and emotional exhaustion among nurses. Because personal resources did not interact with work schedule demands, more research is needed to elucidate the role of personal resources in adapting to shiftwork. It is possible that personal resources mediate the relation between work schedule demands, job resources and work engagement (24). The present study also highlights, the idea that specific job demands and job resources (in this case, the work schedule fit with private life), should match to produce moderating effects on health (31, 93). It also showed the value of using the fit of the work schedule with nurses' private life to help explain the effects of shiftwork on health. Finally, research is needed to clarify the role of work schedule control as a universally beneficial tool to promote health among nurses (112). More research is needed to find out who gains from different levels of work schedule control.

The questionnaire used for measuring the experienced fit between the nurses' work schedule and their private life (SIW) and the categorization of work schedule types could prove to be a valuable tool for managers to assist them to enhance the fit between nurses' social life and their shifts. It may provide a useful framework for discussions between supervisors and nurses aimed at identifying work schedules with good fit. Furthermore, workplace interventions should focus not only on schedule-related characteristics, but also on resources. Therefore, nurses' evaluations of

how their work schedules fit with their leisure activities, family situation, social circumstances, and work–leisure balance should be monitored which allow them to choose between work schedules to enhance fit.

It would be valuable to evaluate the SIW questionnaire, and confirm the present findings, in other occupational groups with irregular work schedules. Suitable groups include police officers and blue-collar workers, who not only differ from nurses in job demands, but also in socio-demographic characteristics.

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Sickness absence of nurses working in residential elder care: both job- and home-related.

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ABSTRACT

Objectives To elucidate the role and pathways of home demands, home and job resources with respect to sickness absence among nurses working in residential elder care.

Methods Longitudinal (SEM)analyses with a one year follow-up among 365 nurses were performed. Analyses were based on survey data and registered sickness absence data. Analyses were controlled for the type of work schedule, working hours, job demands, age, education and gender.

Results More job resources like work schedule fit with private life and more home demands predicted sickness absence one-year later and were mediated through nurses' health rather than nurses' motivation.

Conclusions Adapting the work schedule to the employees' private life and reducing home demands seem a good measure to reduce health-related sickness absence within one year.

SICKNESS ABSENCE OF NURSES WORKING IN RESIDENTIAL ELDER CARE: BOTH JOB- AND HOME-RELATED.

BACKGROUND

Sickness absence is an important problem associated with high social and financial costs for employers, employees and their families (1, 2). Especially in residential elder care sickness absence rates are high and higher than in other healthcare professions (3). Sickness absence of nurses is not only a pressing problem for the nurses themselves, it may also lead nursing staff shortages and it decreases the quality of care (4-6). Therefore, a need for preventive measures exists, to reduce sick leave among nurses. However, sickness absence is a multifaceted and rather complex phenomenon, (7) and more comprehensive models may support its understanding (8, 9).

Most work-stress models (9-11) assume a combination of work-related and personal factors to predict sickness absence. And indeed there is vast evidence that work-related factors predict sickness absence (9, 12-15). Although demanding home situations of nurses also can lead to health problems (16-19), the association between the home situation and sickness absence remains unclear.

One reason may be that a possible positive role of work- and home-related resources is not taken into account. In addition, nurses could value the work schedule itself as a resource (20, 21). Especially for nurses working in residential elder care with different types of work schedules, this possible resource may be of great value to prevent sickness absence (16, 22). Elucidating this will refine theoretical models of nurses with shiftwork. Therefore, main focus in this article will be on home characteristics and job resources to make more progress in this respect.

The Potential of resources

One of the theories that focus on resources is the Conservation of Resources theory (COR) (23) and has been used to explain sickness absence from a resource perspective (12). It seems a valuable theory to emphasize the benefits of work, not only the effect of demands but also that of resources on sickness absence. According to the COR theory, resources are entities that have intrinsic or instrumental value and can be found in the social contexts, including objects, conditions, personal resources, and energy resources (24). Stress results when they risk or actually do lose these resources, the threat of resource loss, or there is a lack of resource gain after the investment of resources (25). The COR theory assumes that there are two ways nurses could react when they encounter stressors in their environment and how those encounters could influence their well-being. The first assumption of COR theory is a loss spiral; people attempt to obtain, retain, and protect resources and that stress occurs when they risk losing, or actually lose, such resources (25). For example, nurses who experience high levels of stress want to keep or regain their energy by reporting ill.

The second assumption of COR-theory is a gain spiral: resources can generate new resources. In the absence of stressors, people strive to obtain more resources. This activity creates buffers for more difficult times and increases well-being because additional resources are valued (16, 26). Social support at home, assisting with home duties, or advice from their partners may help nurses to overcome work problems and consequently increase motivation and performance at work (27). Those nurses experience more physical and psychological resources allowing them to invest further in resources instead of prevent the loss (27-29). This process could lead to less sickness absence. The relationship of work-related resources and well-being, motivation and sickness absence is already well researched (30). However more research on how home resources determine negative and / or positive work consequences among nurses is needed (30-32).

Home resources

In line with the second central assumption of the COR theory, it is plausible that the home domain could serve as a resource for nurses. According to this second central assumption that when resources are obtained, they appear to create a gain spiral, in which resources can accumulate (25). Nurses with, for example, a supportive home or more autonomy at home seem better equipped to handle stressful circumstances and avoid problematic situations. They experience more resources, such as physical health and emotional support (16, 26). Also being part of a family appeared to play a role in the prevention of the development of health problems among nurses (26). Furthermore, home resources have shown to positively influence performance (27). This could allow nurses to invest further in resources instead of to prevent losing them (27-29).

Job resources

Job resources are expected to be negatively related to sickness absence via higher motivation or lower health problems (15, 30). The focus in this research is on the role of home characteristics with respect to sickness absence, but we include specific work schedule related job resources, e.g. work schedule fit with private life, work schedule control and social support at work (21, 33-35) that have proven to diminish the impact of different work schedules. Although it is not always clear-cut if a work or home-related factor is a demand or a resource (30), in the present research the fit of the work schedule with private life is considered to be a resource. If a factor is a demand or a resource depends on how it is valued by nurses. Work schedules negatively influence health problems, sickness absence and job departure (36-38), but they might also be valued as a resource by nurses working in residential elder care. Work schedules provide opportunities for nurses to combine work and care and to relieve home demands (20, 21). In line with the COR-theory, work schedules could be functional in achieving work goals, reduce job demands, or stimulate personal growth and development. Job resources are assumed to predict sickness absence via motivation and health complaints (12, 15, 39).

Sickness absence

Sickness absence is defined as absence from work that is attributed to sickness by the employee and accepted as such by the employer (40). Two most common absence measures are absence episodes and duration (7, 41, 42). As stated, the relationship between home characteristics and sickness absence among nurses seems not straightforward and could be mediated by health and motivational aspects (9, 22).

In general, two different pathways are assumed to influence sickness absence episodes and duration (9, 13, 43). The first pathway is that long-term sickness absence is associated with ill health (12, 13, 44) and this is framed as 'involuntary absence'. According to the COR-theory, home demands predict health complaints such as burnout, fatigue and psychosomatic health complaints and health complaints subsequently predict sickness absence duration (9, 12, 13, 45).

The second pathway assumes that frequent short-term sickness absence is associated with work environmental factors and work engagement and this is framed as 'voluntary absence' (12, 13, 44). According to the COR theory, positive job characteristics lead to positive outcomes such as work engagement, job satisfaction (46), and subsequently these factors lead to less sickness absence episodes (9, 12, 22). Moreover, as mentioned according to the COR theory, home and work-related resources are also negatively related to health complaints. Furthermore, sickness absence duration and frequency seem also to be positively related to each other (12, 39).

Studies investigating the effects of home characteristics on health and sickness absence are scarce and according to Ten Brummelhuis et al. (22) show inconsistent findings. One explanation may be that most studies use simple one-dimensional measures to measure home characteristics such as the number of (small) children, hours spent on housekeeping, or having a relationship or not. For example, Allebeck and Mastekaasa (44) found no evidence in their literature review for an association between sickness absence with quantitative measures, such as marital status and (number of) children living at home. This is in line with other research that found that merely the perception of home characteristics was associated with health and well-being (27, 47, 48). We will use a better measure for home demands. Another explanation for the inconsistent findings could be that the relationship between home characteristics and sickness absence among nurses is mediated by health and motivational aspects (9, 22).

In sum, the aim of the present study is to contribute to a better understanding of the influence of home demands, home resources and work schedule related job resources on nurses' sickness absence. Because research has shown that job demands are related to health and motivational factors (30, 49), we consider job demands in the present research as a confounder of the relations under study.

Hypotheses and research model

Based on the theoretical and empirical findings, it seems important to use a mediation model in the present research, in order to include nurses' home demands and resources and work schedule related job resources to explore the relationship between the home domain and sickness absence. Furthermore, a longitudinal design is essential to examine how home- and job-related resources are related to sickness absence (22, 37, 50). Therefore, and incorporated in the research model (see Fig. 1), it is hypothesized that:

- 1a. Home demands predict positively sickness absence duration via health complaints,
- 1b. Home demands predict positively sickness absence episodes via health complaints,
- 2a. Home resources predict negatively sickness absence duration via both health complaints and motivation,
- 2b. Home resources predict negatively sickness absence episodes via both health complaints and motivation,
- 3a. Job resources predict negatively sickness absence duration via both health complaints and motivation,
- 3b. Job resources predict negatively sickness absence episodes via both health complaints and motivation.

Figure 1: The research model.

METHODS

Sample and procedure

In this longitudinal study self-reported questionnaires were used to measure the independent variables. Registered sickness absence data were used to measure the dependent variables. The participants were nurses (48) in residential care for the elderly. The two facilities that participated were included because the nurses' work schedules generally reflected nursing work schedules in the Netherlands and provided sickness absence data. Questionnaires were sent to the home addresses of all nursing employees. The participants were asked to return them within two weeks. Reminders were sent to all participants two and three weeks after the initial distribution of the questionnaires. The assessment of the questionnaire, which measured the independent and mediating variables, was in October 2009. The questionnaires contained a code to identify participants the second time and to match the organization sickness absence records. To measure sickness absence duration and episodes, we used the organizations' absenteeism reports from October 2009 until October 2010 as dependent variables. This period was chosen because it was long enough to measure possible changes in individual scores and also to control for seasonal effects (51, 52).

Ethical considerations

The study was not submitted to an ethical committee because, according to Dutch law (Wet Medisch-Wetenschappelijk Onderzoek met Mensen/Medical Research Involving Human Subjects Act), surveys only have to be submitted to an ethical committee in a limited number of situations, which do not apply to the present study. The study was approved by the management board of the homes involved. The participants were informed by individual letter and an institutional newsletter, they were free to refuse to participate and welcomed to ask questions and express concerns about the study any time. Return of a completed questionnaire was taken to imply consent. Data were stored anonymously, treated confidentially and the participants' privacy was sufficiently guaranteed.

Sample

The total study population comprised 911 nurses who worked shifts and were employed in one of the two participating facilities. The mean age of the research population registered by the organization before the assessment of the questionnaire was 39.8 years (SD± 12.3), average working week was 21.5 hrs per week (SD± 9.8) and median absence duration was three days per episode and the median episodes was one time per year. Although 'nurse' indicates normally the qualification level of a registered nurse, the current research uses this term for nurses working in residential elder care in the Netherlands. This includes registered nurses, enrolled nurses, licensed vocational or practical nurses and nurse care helpers. In the Netherlands nurses working in residential elder care are comparable with respect of qualification level to Dutch nurses working in hospitals,

home care, care for disabled people and mental health care but do have different psychosocial and physical demands (Simon et al., 2008). At Time 1, 462 questionnaires (51%) were included. Only new sickness absence incidents were included. Respondents who left the job, nurses who did not respond, or without sick leave registration were not analysed.

Measures

Home demands

Home demands were operationalized as three psychosocial home characteristics: 1) emotional home demands, 2) quantitative home demands and 3) cognitive home demands, and measured as follows: Emotional home demands contain four, quantitative home demands five and cognitive home demands four items; they are scored on a 4-point scale ranging from 0 'never' to 3 'always'. Example items are: *"How often do emotional issues arise at home?"*, *"Do you find that you are busy at home?"* and *"Do you find that you have to plan and organize a lot of things in relation to your home life?"* The internal consistency found (Cronbach's alpha) is 0.76, 0.80 and 0.80, respectively (47).

Home resources

Home resources were measured with three psychosocial home characteristics: 1) home autonomy, 2) social support at home and 3) the possibility to arrange something else. Home autonomy contains four items scored on a 5-point response scale, ranging from 0 'never' to 4 'always'. An example item is: *"I have control over how I use my free time"* (27). The internal consistency (Cronbach's alpha) is 0.74. Social support at home (53) contains eight items (measuring social support from one's spouse, relatives and friends) scored on a 5-point response scale ranging from 0 'never' to 4 'always'. An example item is: *"To what extent is/are your [spouse/relatives/friends] willing to listen to your problems?"* The internal consistency (Cronbach's alpha) is 0.88 and a single-item question. The possibility to arrange someone or something else was measured with a single item: *"When something unexpected happens in your home situation, to what extent is it possible for you to arrange things?"* This scale uses a 4-point response scale that ranges from 'never' to 'always' (54).

Job resources

Job resources were measured with three psychosocial job characteristics: 1) work schedule fit with private life, 2) work schedule control and 3) social support at work. Satisfaction with Irregular Working hours (SIW) (16) was used to measure the extent to which the work schedule fits with nurses' private life, particularly in relation to leisure time, family situation, social circumstances, sleep and work-leisure time balance. The scale consists of fourteen items that are scored on a 5-point response scale ranging from 1 'entirely dissatisfied' to 5 'entirely satisfied', for example:

"How satisfied are you with the quality of your contact with family, friends and spouse given your irregular working hours?" The internal consistency (Cronbach's alpha) was 0.89 (16). Work schedule control (WSC) was measured with a scale that assesses perceptions of having choice and influence over starting and ending times, days off, breaks during the workday, swapping shifts and taking unpaid leave. It consisted of 10 items scored with either 1 ('yes') or 0 ('no'). Example item is: *"Can you decide to take a break when you want?"* The internal consistency (Cronbach's alpha) was 0.66 (55). *Social support* refers to the worker's perceived social support from supervisors and colleagues. This was measured using a 10-item scale derived from a Dutch questionnaire for organisational stress (56). This scale uses a 4-point response scale that ranges from 0 'never' to 3 'always' (Item example: *"If you have problems at work, can you discuss them with your colleagues?"*) (Cronbach's $\alpha = 0.82$).

Health complaints

Health complaints were measured with three indicators: 1) Emotional exhaustion, 2) General fatigue and 3) Psychosomatic health complaints. Emotional exhaustion was measured using a subscale of the Dutch version of the Maslach Burnout Inventory-General Survey (57). Emotional exhaustion seems the most characteristic burnout dimension in general and in nursing (58-60). The Maslach scale contains five items that are scored on a 7-point response scale ranging from 0 'never' to 6 'always'. An example of the items is *"Working all day is really a strain for me"*. The internal consistency (Cronbach's alpha) is 0.84-0.90. General fatigue was measured with the Multidimensional Fatigue Inventory (MFI) (61). This scale has four items scored on a 5-point scale ranging from 'yes, that is true' to 'no, that is not true'; a higher score indicates more general fatigue. An example item is *"I feel very tired"*. The internal consistency (Cronbach's alpha) is 0.84. *Psychosomatic health complaints* were measured with a 13-item version of a Dutch perceived health questionnaire (VOEG (Vragenlijst Onderzoek Ervaren Gezondheid [Perceived Health Questionnaire]) developed by Dirken (62). The VOEG contains items that ask if the respondent suffers from a range of psychosomatic complaints, such as headaches and backache. Each item is scored with either 'yes' or 'no'. A higher score reflects the presence of more psychosomatic complaints. An example of the items is *"Working all day is really a strain for me"*. Internal consistency estimated by Cronbach's α is 0.75-0.93.

Motivation

Motivation was measured with three indicators: 1) Work Engagement, 2) Job Satisfaction and 3) Turnover intention. Work engagement was used to assess positive consequences. It was measured with the short version of the Utrecht Work Engagement Scale (UWES-9). It measures a positive, work-related state of fulfilment that is characterized by vigour, dedication and absorption. It consists of nine items and has been found to be reliable and valid (63). Participants responded on a seven-

point Likert scale, ranging from 'never' (0) to 'always and daily' (6), with higher scores indicating greater work engagement. Examples of items are: *"At my work I feel bursting with energy"* (vigour), *"My job inspires me"* (dedication) and *"Time flies when I am working"* (absorption). The internal consistency (Cronbach's alpha) is 0.93. *Job satisfaction* was measured using a single item asking *"How satisfied are you with your job in general?"* scored on a 10-point scale ranging from 1 'very dissatisfied' to 10 'very satisfied'. *Turnover intention* was measured by means of a 4-item scale originating from the Dutch Quality of Work Questionnaire [Vragenlijst Beleving en Beoordeling van de Arbeid (VBBA)] (64) ranging from 0 'no' - 1 'yes'. An example item is: *"I intend to leave this organization this year"*. The internal consistency (Cronbach's alpha) is 0.90.

Sickness absence duration and episodes

Sickness absence was assessed using the organizations' absenteeism reports. Pregnancy leave was not categorized as sickness absence. Sickness absence was registered according to the usual procedures in the Netherlands by the organization according to the number in days and duration of absence episodes for each person and was linked to the data from the questionnaire by a code. To measure the sickness absence duration, the total number of sick days that each employee had taken between October 2009 and October 2010 were counted, irrespective of the actual working hours. The sickness absence episodes were assessed as the number of absences between October 2009 to October 2010. Absence due to special leave or vacation is not included in this measure. Because both measures showed a non-normal distribution, log transformations were performed. This resulted in good normal distributions for sickness absence duration (skewness = .798, SE = .126; kurtosis = -.533, SE = .252) and sickness absence episodes (skewness = .339, SE = .126; kurtosis = -1.076, SE = .252).

Confounders

The type of work schedule (48) and several work and personal characteristics were taken into account as they may correlate health, motivation and sickness absence duration and episodes (10, 15, 30, 48, 65) and therefore confound the relationships under study. *The type of work schedule* nurses worked was measured by a new developed typology (66) which divides the work schedules into five types: Type 1: fixed early shift; Type 2: rotating two-shift pattern (early and afternoon shifts); Type 3: rotating three-shift pattern (early, afternoon and night shifts); Type 4: fixed and rotating two-shift pattern including night shift; and Type 5: fixed normal day or afternoon shifts. The second work schedule demand was the average number of weekly working hours, which was assessed with the following item: *"How many hours are you contractually required to work each week?"* The variables were recoded using CATPCA to quantify the type of work schedule and working hours per week with job demands as indicator variables (67). *Job demands* were measured by three dimensions relevant for nurses working in residential elder care: 1) quantitative, emotional and

physical job demands. They were measured with reliable scales originating from the Dutch Quality of Work Questionnaire [Vragenlijst Beleving en Beoordeling van de Arbeid (VBBA)] measuring quantitative job demands, emotional job demands and physical job demands (64). The CATPCA resulted in a five-point scale for the type of work schedule: type 1=.67, type 2=-.39, type 3=1.014, type 4=-.77, and type 5=-3.06 indicating that there were differences in line with (68) between the types of work schedules: type 3 schedule was the most demanding work schedule and type 5 schedule the least demanding work schedule. The quantifications of the type of work schedule and weekly working hours, age, education and sex have paths to sickness absence duration and episodes, and to health and motivation.

Analysis

Structural equation modelling (SEM, IBM SPSS AMOS 20) was used to answer the research questions (69). We used a two-step approach (70) by first testing the fit of the model's measurement components followed by testing the structural model. The measurement model included five latent variables according to the theoretical model: Home demands, Home resources, Job resources, Health and Motivation.

To test the structural model a nested model approach was used. The model for these analyses included three exogenous latent factors: home resources, home demands and job resources and two endogenous latent factors: health and motivation. We compared three models: the hypothesized, parsimonious model in which the home demands predicted sickness absence duration and episodes via health and home resources and job resources predicted sickness absence episodes via motivation (M1), the M1 model with paths added linking the home and job resources to health (M2) (30) and a model testing partial mediation, similar to M2 but with direct paths linking home and job resources and home demands to absence duration and episodes. We tested whether a more parsimonious model fit the data just as well as the research model with more parameters by using a chi-square difference test. The endogenous latent job resources were allowed to correlate with the latent factors 'home demands' and 'home resources'.

Chi², Chi² difference test, GFI, RMSEA, NFI, and SRMR were assessed. The Chi², GFI, RMSEA and SRMR were used to examine the fit of the measurement model to the data. Models with RMSEA below .05 in combination with SRMR values below .09 indicate excellent fit, whereas values below .08 and .10, respectively, are still indicative of a good fit. Models with fit indices of >.95 and an RMSEA of <.06 indicate a close fit between the model and the data. Fit indices between .90 and .95 represent a reasonable fit (71) although Marsh et al. recommend lower values of cut-off values (72). In addition, the IFI and the PNFI were used as relative fit indices and to penalize models that are less parsimonious. The error terms of the control variables were allowed to correlate based on the modification indices. In the final model, type of work schedule, average working hours per week, age, education and gender in line with Olsen and Dahl (38) were included as control variables.

To test the significance of the regression weights between the predictors, mediators and sickness absence measures and to test the indirect and total effect bootstrapping was used. Bootstrapping is a statistical resampling method that estimates the parameters of a model and their standard errors strictly from the sample (73) and is especially useful when testing a multiple mediator model. New samples were extracted (with replacement) from the sample 2000 times and calculated all direct and indirect estimates of the hypothesized model. Bootstrapping computes more accurate confidence intervals (CIs) of indirect effects than the more commonly used methods, such as the causal steps strategy (74) and the Sobel test. The null hypothesis, which states that x does not have an indirect effect on y via m , is rejected when the entire CI lies above or below zero.

RESULTS

Before the first assessment on baseline (T0), according to the organizational databases, nurses ($n=911$), were 39.8 years old ($SD \pm 12.3$) and worked 21.4 hours per week ($SD \pm 9.9$) on contractual basis. As can be seen in Figure 2, 462 responded (51%) at the first questionnaire assessment (T1, October '09). The average age of the respondents (42.2 years; $SD \pm 12.1$) according to the organizational databases was higher than (t -value = 6.537 (889), $p < .001$) the non-respondents (36.9 years; $SD \pm 11.9$). The average working hours per week did not differ between the respondents and non-respondents. Of the 462 nurses that responded to the assessment of the questionnaire (T1, October '09), 97 were finally excluded because one year later they quit the job, no sickness absence data were available, or were absent due to long term sickness at baseline.

Figure 2: Flowchart of inclusion process an t-tests between nurses that were included and were not included.

The final group ($n=365$) comprised mainly women (97.6%), which is normal for residential health care in the Netherlands. The mean age of the respondents was 41.5 years ($SD=12.1$). Twenty-two respondents (6%) had full-time contracts (36 contractual work hours a week). Sixty-seven percent had children living at home and 33.4% had children below the age of twelve. Correlational analyses showed that these background variables were only marginally related to the model variables (Table 1).

The nurses that finally were included ($n=365$) were compared to the nurses that were excluded. With respect to the outcome variables, sickness absence duration (t -value = -1.235 (443), $p > .05$) and episodes (t -value = -1.714 (443), $p > .05$) of 2009 did not differ between the respondents and non-respondents. When the sickness absence duration and episodes of our sample between 2008-2009 and 2009-2010 were compared, the mean sickness absence duration was similar (t -value = 1.869 (364), $p > .05$). The number of sickness absence episodes was higher in 2009 compared to 2010 (t -value = 3.667 (364) $p < .05$), Cohen's $d=0.211$ which means a small change (75). Gender differed slightly between the respondents and non-respondents with somewhat more males that non-responded; $\chi^2(1) = 5.255$, $p = .022$. Hours worked per week (t -value = -2.101 (456), $p < .05$) was higher among the respondents with a Cohen's $d=0.244$ which means again a small difference (75).

Descriptive statistics

Table 1 shows the descriptive statistics for each variable measured in the study, the correlation coefficients and the internal consistency of the scale measures.

Results of Structural Equation Modelling

The measurement model showed a reasonable fit to the data ($\chi^2(80) = 209.17$ ($p < .001$), CFI = .92, GFI = .93, TLI = .89, RMSEA = 0.067), with all significant loadings on the intended factors ranging from .38 to .85. To test the validity of the measurement model with five factors, we compared it with an one factor model. The fit of the five factor measurement model was better than the fit of a one factor model ($\chi^2(90) = 741.0$ ($p < .001$), CFI = .57, GFI = .76, TLI = .50, RMSEA = 0.141).

Table 1: Means, standard deviations, correlations, and reliabilities between brackets of model variables ($n = 365$).

	M	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1 Gender	1.98	0.16																					
2 Age T1	41.54	12.06	-.015																				
3 Education T1	5.22	1.27	-.070	-.178**																			
4 RST T1*	0.00	1.00	-.031	-.177**	.103*																		
5 Hours worked T1#	0.00	1.00	-.125*	.095	.049	.363**																	
6 Quantitative home demands T1	1.31	0.52	-.006	-.087	-.014	.070	.011	(.79)															
7 Emotional home demands T1	0.65	0.50	.056	.131*	-.020	-.011	.021	.460**	(.82)														
8 Cognitive home demands T1	1.18	0.73	.059	-.002	.058	-.027	-.113*	.617**	.520**	(.88)													
9 Autonomy at home T1	2.82	0.68	.036	.055	.078	-.040	.016	-.119*	-.182**	-.015	(.74)												
10 Aut_arrange someone else T1	2.10	1.18	-.046	-.058	.068	.042	-.036	-.315**	-.285**	-.211**	.281**												
11 Social support pff T1	2.60	0.79	-.031	-.187**	.071	-.022	-.028	-.297**	-.245**	-.255**	.181**	.353**	(.89)										
12 SIW T1	3.55	0.60	.081	-.078	.006	-.201**	-.221**	-.354**	-.236**	-.177**	.242**	.227**	.217**	(.92)									
13 Work schedule control T1	0.35	0.21	.004	.036	-.061	-.195**	-.139**	-.164**	-.120*	-.053	.116*	.195**	.062	.328**	(.61)								
14 Social support at work T1	2.22	0.47	.096	-.104*	.031	.067	.005	-.037	-.129*	-.039	.178**	.162**	.211**	.293**	.277**	(.85)							
15 Emotional exhaustion T1	2.05	1.26	-.016	.085	-.139**	.079	.208**	.209**	.141**	.099	-.096	-.196**	-.132*	-.406**	-.139**	-.189**	(.90)						
16 Psychosomatic health complaints T1	0.29	0.22	-.057	.034	-.114*	-.006	.120*	.317**	.250**	.243**	-.157**	-.221**	-.197**	-.342**	-.135**	-.203**	.531**	(.77)					
17 MVI T1	2.73	1.06	.039	-.139**	-.072	.006	.079	.328**	.276**	.273**	-.136**	-.224**	-.204**	-.282**	-.196**	-.215**	.484**	.657**	(.89)				
18 Work engagement T1	4.49	0.96	.069	-.065	-.025	.140**	.117*	-.126*	-.176**	-.073	.159**	.178**	.209**	.279**	.171**	.465**	-.175**	-.206**	-.281**	(.93)			
19 Job satisfaction T1	7.30	1.32	.103*	-.075	-.005	-.018	-.096	-.169**	-.227**	-.066	.100	.232**	.196**	.420**	.264**	.390**	-.328**	-.212**	-.221**	.562**			
20 Job Leave T1	0.74	0.31	.092	.142**	-.069	-.079	-.087	-.144**	-.056	-.093	.072	.101	.059	.258**	.183**	.339**	-.157**	-.153**	-.145**	.396**	.536**		
21 Sickness absence duration T1 - T2#	0.72	0.67	.032	-.073	-.143**	.024	.137**	.066	.041	.015	-.054	-.058	.070	-.111*	-.066	-.077	.157**	.155**	.160**	-.044	-.066	-.059	
22 Sickness absence episodes T1 - T2#	0.33	0.27	.044	-.104*	-.147**	.043	.073	.064	.068	.030	-.029	-.087	.028	-.157**	-.029	-.028	.186**	.136**	.176**	-.071	-.072	-.053	.802**

* $p < .05$, ** $p < .01$

after transformation

Table 2: Results of Structural Equation Modeling

Model	χ^2	df	RMSEA	90% CI	SRMR	GFI	AGFI	IFI	PNFI	$\Delta\chi^2(df)$	p
Saturated model	.000	0				1.000		1.000	.000		
M1 Parsimonious model	418.8	171	.063	.055-.071	.0683	.907	.868	.885	.607		
M2 Resources to Health Complaints	383.7	169	.059	.051-.067	.0584	.914	.871	.901	.611	35.17 (2)	<.001
M3 Partial mediation Independent? model	376.0	163	.060	.052-.068	.0580	.915	.862	.902	.592	7.64 (6)	=.266
	2331.6	231	.158	.152-.164	.000	.545	.502	.000	.000		

The results of these analyses show that the M1 model fitted reasonable good to the data (see Table 2), but that linking job and home resources to the latent variable 'health complaints' improved the Chi-square significantly (M2). Adding direct relationships from the latent exogenous variables home demands, home resources and job resources to the sickness absence measures (M3) did not significantly improve the chi-square. In addition, the RMSEA was the lowest and (.059) under the threshold for M2, SRMR was sufficient in combination with the RMSEA. The PNFI was the highest for the M2 model compared to both other models. Therefore, M2, linking home and job resources to health complaints was considered the best-fitted and most parsimonious model.

Figure 3: The final model (controlled for the type of work schedule, average number of weekly working hours, gender, age and education).

The pathway estimates of the final structural model are shown in Figure 3. Home demands were positively related to health complaints ($\beta = .62$; LCI – UCI= .25 – 1.05; $p = .005$). Job resources ($\beta = 2.22$; LCI – UCI= 1.57 – 3.64; $p = .001$) were positively related to motivation. Job resources were negatively related to health complaints ($\beta = -1.50$; LCI – UCI= -2.95 – -.71; $p = .001$). Health

complaints was positively related to sickness absence duration ($\beta = .19$; LCI – UCI=.09 – .29; $p = .001$) and sickness absence episodes ($\beta = .06$; LCI – UCI= .02 – .09; $p = .002$). The model explained 9% of the variance in sickness absence duration and 8% of the variance in absence frequency.

The results of the indirect and total effects bootstrap results are shown in Table 3.

Table 3: Bootstrapping results of indirect and total effects of home demands and home and job on sickness absence duration and episodes through health (m1) and motivation (m2).

x→m1→y	Bootstrapping		BC 95% CI		p=
	Coeff	SE	Lower CI	Upper CI	
HD → health complaints → Sickness absence duration	.116	.058	.034	.264	.003
HD → health complaints → Sickness absence episodes	.034	.018	.009	.084	.004
HR → health complaints → Sickness absence duration	.017	.080	-.067	.214	.665
HR → health complaints → Sickness absence episodes	.000	.016	-.027	.039	.986
JR → health complaints → Sickness absence duration	-.282	.148	-.635	-.097	.001
JR → health complaints → Sickness absence episodes	-.085	.045	-.204	-.022	.001
x→m2→y					
HR → motivation → Sickness absence episodes	.004	.011	-.003	.056	.199
JR → motivation → Sickness absence episodes	-.050	.042	-.148	.021	.139
x→m1, m2→y					
HR → health complaints, motivation → Sickness absence episodes	.007	.027	-.020	.082	.562
JR → health complaints, motivation → Sickness absence episodes	-.108	.062	-.256	-.017	.024
Total effects					
HD → Sickness absence duration	.116	.058	.034	.264	.003
HD → Sickness absence episodes	.034	.018	.009	.084	.004
HR → Sickness absence duration	.017	.080	-.067	.214	.665
HR → Sickness absence episodes	.007	.027	-.020	.082	.562
JR → Sickness absence duration	-.282	.148	-.635	-.097	.001
JR → Sickness absence episodes	-.108	.062	-.256	-.017	.024

Coeff = unstandardized coefficient; SE= bootstrap estimate of the standard error; BC=two-sided bias-corrected bootstrap confidence interval for the indirect effect; LLCI= lower endpoint of a two-sided bias-corrected bootstrap confidence interval; ULCI=upper endpoint of a two-sided bias-corrected bootstrap confidence interval

The results indicated that the indirect relationships between home demands and sickness absence duration and sickness absence episodes were significant. The total effects analysis confirmed these findings. The results indicated that the indirect relationships between job resources and sickness absence duration and sickness absence episodes were significant. The indirect effect on sickness absence episodes via motivation was not significant. The total effects analysis confirmed these findings.

DISCUSSION AND CONCLUSION

The aim of the current study among nurses working in residential elder care was to gain insight in the role of home demands, home and job resources with respect to sickness absence duration and episodes, and whether these relationships are mediated by health complaints and motivation, with the COR-theory as a framework.

Using absence data collected during the year following the assessment of home demands, home resources and job resources, and controlled for the type of work schedule, working hours, age, education and sex, our study supported hypotheses 1a, 1b and merely supported 3a and 3b. Home demands (in this research emotional, quantitative and cognitive home demands) and job resources (in this research the work schedule fit with private life, work schedule control and social support from colleagues and supervisors) are predictive for sickness absence duration and episodes via health complaints but not via motivation. Job resources are positively related to motivation. The findings are in support of the health related theories rather than in support of the motivational theories for sickness absence (9).

With respect to hypotheses 1a and 1b, home demands have an indirect adverse effect on both sickness absence duration and episodes of nurses via health complaints. Nurses with more home demands have more health complaints, which in turn results in longer sickness absence duration and more sickness episodes. These findings agree with some previous research (17, 22), which showed among mainly white collar workers that home demands lead to sickness absence duration and to absence episodes. Our research shows that these relationships are also applicable to a nursing population working in residential care. This is most probably explained by the fact that women are still more responsible for household and childcare than men are (76, 77). Especially nurses with extensive family responsibilities focus more on that, than on their own health and well-being (78). An overload of home demands reduces nurses’ time to recover from work and could consume their physical and psychological resources (29, 79, 80). This idea is supported by the COR theory that stress and health problems occur when nurses risk losing, or actually lose resources in their home domain consequently leading to sickness absence (25). Thus, health problems caused by home demands are predictive for ‘involuntary’ absenteeism which is in line with health related theories to explain sickness absence (9) and the conflict approach that describes depleting processes between the home domain and work outcomes (81).

Hypothesis 3a, concerning the indirect effect of job resources, was partially confirmed. Job resources, in this research the work schedule fit with private life, work schedule control and social support from colleagues and supervisors, had an indirect protective effect on sickness absence duration and sickness absence episodes of nurses via health but not motivation. Nurses’ job resources show less health complaints, which in turn resulted in lower sickness absence duration and less sickness absence episodes. According to the COR theory (25), nurses who experience more job

resources, are more able to gain resources and are better able to preserve health in demanding situations and consequently prevent prolonged absence from work. Lack of job resources, such as low work schedule fit with private life, low control over work schedules and less social support of colleagues and supervisors seem especially harmful for a mainly female working population working in emotional demanding jobs (16, 82-84). The findings imply that, although it is found that the home situation for nurses working in residential elder care facilitate recovery from work (26, 79), arrangements at the job seems an essential resource to counterbalance the demands at home.

In contrast with research among managers and executives of a telecom company (12) and employees of a nutrition production company (39), in the present study sickness absence episodes were not related to motivational factors. It seems to imply that findings among other employees are not transferable to the nursing population. This could be due to the fact that nurses can generally be characterized as a highly engaged working population (32, 85). Additional analysis showed indeed that the nurses in our research were significantly more work engaged than reference scores accompanying the UWES manual (86) ($t=14.864$ (373); $p<.001$) and compared to a group of American nurses (87) ($t=3,952$ (373); $p<.001$). Furthermore, they were significantly more satisfied with their job ($t=11.863$ (373); $p<.001$) (88).

Home resources (in the present study autonomy at home, social support at home and the possibility to arrange someone else when needed), were neither related to health or motivation nor related to sickness absence duration or episodes via health or motivation. An explanation is that due to shiftwork, nurses' social life is disrupted which restrains them from psychological resources such as emotional support from family or friends, information or advice (79, 89-91). Another explanation can be that home resources, in contrast with home demands, have merely an effect on family-related variables, which were not included in the present research. For example Hakanen et al. (92) found effects of home resources on home- or family-related outcomes.

The lack of an effect of motivation on sickness absence episodes could be explained by Dutch female employees, including nurses mostly working part-time, which differs from other European countries (93). The nurses in our study might have had their voluntary 'sick days' on their days-off, but we did not find empirical evidence for this. Moreover, shiftwork problems are looked upon by nurses as a self-evident consequence of shiftwork and not as reasons for sick leave (94).

Methodological reflection

The strengths of this study are its longitudinal design using registered sickness absence data of the following year, the extensive questionnaire based on our research model includes well-known and validated instruments, which also made it possible to consider potential confounding factors, such as work schedule related demands and socio-demographic factors.

To test the robustness of our research model, an alternative model was tested whereby the type of work schedule was fitted into the model as an exogenous variable besides the other exogenous

variables home demands, home resources and job resources. This resulted in the same significant direct and indirect effects. Therefore, the robustness of our research model seems sufficient. Furthermore, the choice between our research model and the alternative was made because the Chi² difference test showed a worsened fit in the alternative model ($\Delta\text{Chi}^2(df)=64.1(11)$; $p<.001$). This was also confirmed by a higher RMSEA (.064) and lower GFI (.90). Also, the alternative model explained a lower amount of variance in sickness absence duration and episodes.

Although sickness absence was not verified by a company doctor, the sickness absence data gathered from company records are preferable above sickness absence measured by self-reported questionnaires (95) which are prone to recall bias. Moreover, the assessment of the questionnaires was at the start of the research one year before the assessment of the sickness records. A one year time lag was chosen in order to cancel out seasonal fluctuations in registered sickness absence (51). The variance in absenteeism that was explained by health is also higher than in other studies (12, 39); 9% of sickness absence duration and 8% of sickness absence episodes.

Furthermore, there is positive evidence regarding representativeness. The respondents' age, sex, average weekly working hours and number of years in their current jobs were comparable to those of nurses working in comparable facilities in the Netherlands (3). However, the prevalence of part-time work of other European countries, varies with the Netherlands as a leading country in part-time working (93). Extrapolations of our findings to European countries other than the Netherlands have to be made with care.

The present study has also some other limitations. The variables under examination slightly differ between the respondents and non-respondents; the nurses that are included experienced lower work schedule control than the nurses that are not included implying a small effect ($d=.358$) (75). Nurses included in this study show a small decrease of sickness absence episodes compared to the year before the assessments of the questionnaires. Because of this small effect and because the other variables under study did not differ between the responders and non-responders, it can thus be concluded that selective dropout is not a serious problem in the present study.

Finally, the measurement of the demands, resources, health and motivation is based on self-reports, which could lead to inflated associations due to common method variance. However, the bivariate correlations are not unusually high, different scale ranges were used and Harman's single factor test did not explain a large portion of variance (29%). Although the model is based on theoretical and empirical grounds, reciprocal relationships could exist (51). For example, nurses with health complaints or motivational problems could change to a less demanding work schedule (96, 97). Consequently, the nurses that are not included possibly could have quit the job or nursing. This could have led to an underestimation of the associations between the home demands, home and job resources and health.

Conclusion and implications

This study contributes to the existing knowledge on pathways from the home and job situation to sickness absence duration and episodes. It shows that home demands enhance sickness absence duration and episodes via health complaints and not via a motivational pathway. It also shows that job resources prevent sickness absence via health complaints and not via a motivational pathway. Furthermore, it shows that more job resources enhance motivation.

The present findings have implications for future research and practice. Although determinants could be differently valued, based on the COR-theory, the present research shows that the type of work schedule and its fit with private life is valued as a resource by nurses working in elder care. To further elucidate what the demands and resources are for specific working populations (9, 30), the ICF-framework could be helpful. This framework categorizes participation, health and health status of employees and the factors that impact these without valuing determinants on beforehand as a resource or demand (8, 98).

Future research could explore the research model with at least a three wave design making it possible to confirm the causal relationships found in the present study between the home demands and job resources and to test for reciprocal relationships. Furthermore, it would be interesting to test if resources are only effective within their domain and demands have detrimental effects on both work and home-related outcomes for nurses working in elder care. Our findings have also implications for more specific research model such as the model used for the standard shiftwork index. Those models focus on demands and detrimental effects of shiftwork. Our findings emphasize the importance of including work schedule related job resources and home demands in future shiftwork models. Therefore, it is important to validate our findings to other professions with shiftwork.

Now we know more about the origin of sickness absence it is possible to pinpoint future interventions that should be tested to prevent sickness absence duration and episodes among nurses working in elder care. To decrease home demands, supervisors should consider their employees' situation at home when supporting them. For example Odle-Dusseau et al. (99) showed that family oriented supervisor increased performance and job-related attitudes among health care workers. Furthermore, nurse supervisors should pay attention besides home demands, to job resources to protect for sickness absence. One way to do so is to use the SIW-questionnaire for measuring the experienced fit between the nurses' work schedule and their private life as a tool to assist them to enhance work schedule fit on a tailor-made basis. Finally, workplace interventions should periodically monitor health of nurses working in elder care more than once a year regarding the dropout in the present study. This is not only interesting for residential elder care, but also for other female professions, which have to fit their varying work schedule with their private life.

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General discussion

In the studies presented in this thesis, the target group is nurses working in residential elder care. This group has greatly varying types of work schedules, and high rates of health complaints and sickness absence. This thesis aimed to clarify whether the types of work schedules could act as a resource and have a positive effect on labour participation, in terms of well-being, motivation and sickness absence, of nurses working in residential elder care. In addition, this thesis aimed to clarify the relationship between home-related demands and home-related resources on the one hand, and participation of nurses working in residential elder care in terms of well-being, motivation and sickness absence, on the other. These aims were addressed in five different studies for which two datasets were used: one cross-sectional sample, and one longitudinal sample with organisational recorded sickness absence reports.

This chapter discusses the main findings of the studies, addresses theoretical and methodological considerations, makes suggestions for further research, and presents some recommendations for policy and practice.

MAIN FINDINGS

Two new instruments were developed to address the study aims: 1) an instrument to measure the 'work schedule fit with private life' (WSF) and 2) an instrument to classify nurses' types of work schedule. The first tool (to measure the WSF of nurses) is described in Chapter 2. Although most theories or models emphasise the negative effect of a work schedule on health, the beneficial elements of certain types of work schedules with respect to aspects related to well-being (e.g. valuable social time, and quality time with children) should also be considered (2). However, no suitable instrument was available to measure the fit of several important aspects related to shift work. Therefore, the first cross-sectional study was based on the work status congruence theory (3), in order to develop a valid and reliable scale to measure the work schedule fit with private life. Our instrument, the 'work schedule fit with private life' (WSF) scale, proved to be a reliable and valid construct (Chapter 2). Work-related factors were associated with the WSF. In turn, the WSF was associated with health, i.e. a better WSF was associated with fewer health problems thereby confirming its independent relation with health. However, the work schedule fit with private life did not mediate between work and home-related (external) characteristics of nurses on the one hand and health on the other. Furthermore, in this first study, the home-related external factors related to nurses' health supported the comparable relationships in the ICF model. Thus, in line with the ICF model used as a frame of mind for this thesis, nurses' health was shown to be related to both home-related and work-related external factors.

Typologies of work schedules generally use a dichotomous measure that roughly distinguishes between day workers, and non-day or shift workers (4), or a single shift characteristic (5). In our work, although a more extensive questionnaire would have better described the type of work

schedule, the longer length would probably have increased the risk of non-response. In addition, a lengthy questionnaire decreases the feasibility and/or practical value for supervisors and/or human resource managers. In Chapter 3 we developed a new typology with the aim to combine the best of both worlds based on the actual work schedules in our second sample of nurses. This was reduced in a systematic way to a typology consisting of five types of work schedules. The study in Chapter 3 shows that this measure is a valid and reliable instrument for studies on work-related aspects of nursing, and classifies shifts into a more detailed level, thereby meeting the challenge to include more shift characteristics in research (5).

Based on this new typology, the study described in Chapter 4 reveals the considerable differences between the types of schedules regarding work schedule characteristics, nurses' sociodemographic characteristics, and nurses' appraisal of the work schedule. Nurses in type 3 schedules (three rotating shifts, the most demanding work schedule) were younger, higher educated, the least satisfied with the fit of their work schedule and private life, and experienced the least control over their work schedule compared to nurses with other types of work schedules. Therefore, other types of work schedules appear to offer more opportunities for older nurses to adjust the schedule to their preferences. The study in Chapter 4 also shows that nurses' participation in terms of well-being, motivation, and sickness absence is mainly related to differences between the types of work schedule, although the lifespan age also played a role.

The large differences between nurses working in the different types of work schedule also suggest that work schedules could be a resource for nurses. However, in relation to health outcomes, it is not always clear whether a phenomenon should be considered a resource or a demand (6). Our reasoning was based on the COR theory (7) and the Job Demands-Resource model (6, 8). These two theoretical approaches have gained support due to the growing interest in the benefits and positive aspects of work, rather than focusing solely on the negative aspects. Using our second sample and a longitudinal design, in Chapter 5 it was shown that a job resource, i.e. work schedule fit with private life, buffered the positive effect of a demanding type of work schedule on emotional exhaustion one year later. However, the other job resource - work schedule control - reinforced rather than buffered the effect of high work schedule demands on emotional exhaustion one year later. Further, it was found that work schedule fit with private life predicted work engagement one year later, especially in the presence of high demands of the work schedule. These findings underline the dynamic interactions between work-related resources and demands of the ICF model. In contrast to expectations based on the ICF model, personal resources (active coping, a healthy lifestyle) did not appear to be relevant.

The study in Chapter 5 shows that these findings were in line with the COR theory and the Job Demands-Resource model. Therefore, the potential of work schedule fit with private life for nurses working in residential elder care as a resource is confirmed. Work schedule control strengthened

rather than buffered the positive relationship between work schedule demands and emotional exhaustion one year later and is, therefore, not a resource.

Lastly, in line with the ICF model, we aimed to test the role of job resources with respect to participation, home demands, and resources. Moreover, it was aimed to establish whether the effect of home and job resources would be mediated by health complaints or by motivation. This thesis shows that for nurses working in residential elder care, health-related theories of sickness absence are supported. Home demands positively predict and job resources negatively predict sickness absence duration and sickness absence episodes via health complaints, and not via a motivational pathway. In line with the second principal of the COR theory, i.e. the gain spiral (7), those nurses with a better work schedule fit with private life are less vulnerable to resource loss and more capable of orchestrating resource gain. This is also underlined by the positive relationship between more job resources and higher motivation of nurses.

THEORETICAL AND CONCEPTUAL IMPLICATIONS

This thesis has revealed several theoretical implications that need to be considered with respect to the participation of nurses working in residential elder care in terms of well-being, motivation and sickness absence.

Demands count, also home demands

Although this thesis shows that the work schedule fit with private life is considered to be a work-related resource, it is important to note that also negative effects of work schedule-related demands and home-related demands were found. Besides the work-related demands reported in many studies, in this thesis nurses working in residential elder care perceived their home situation as a demand and not a resource, and this predicted more sickness absence via more health complaints.

The concept of lifespan age emphasises the way nurses have arranged and organised their life and can be measured, for example, by means of the life stage or family status (9). Lifespan age was associated with participation (Chapter 4). The youngest nurses worked in the most demanding work schedules, but were relatively older (on average $\pm$ 38 years). However, chronological and organisational age are hardly related to participation in terms of well-being, motivation and sickness absence. This again emphasises the importance of focusing on nurses' lifespan age, rather than on a specific age level, with respect to work participation.

Although our studies showed some indications that resources can be found in the home setting (Chapter 2 and 4), these were not confirmed longitudinally. The majority of nurses in our two samples were female. In the Netherlands, women are still expected to combine taking care of children and work. Generally, they experience a lower quality of their free time (10, 11). Also, they probably have less time to recover and use their free time to fulfil care and home tasks. Remarkably, our cross-

sectional analyses showed that the number of children was related to increased participation, or protected against participation problems. According to the role accumulation theory, combining work and home may produce positive effects for employees (12). These findings might also indicate a selection effect: having children prompts employees to work their preferred type of work schedule, with fewer working hours per week (13, 14) as a conscious choice to arrange childcare in combination with the partner's job (15, 16). However, the interaction effects of home resources and work (schedule)-related demands were not tested.

Therefore, although causal processes still need to be elucidated, the home situation seems to be experienced by nurses as a demand rather than a resource. This thesis also shows that nurses' perception of their home situation is preferable to using more objective home characteristics (cf. 17).

Work schedule fit with private life is a resource

Many studies have demonstrated the negative consequences of job demands, whereas our studies show the potential of work schedules to diminish the negative effects on nurses' participation if the work schedule fits with their private life. This work provides insight into the work schedule as a resource on a relatively short term, i.e. a one-year timeframe for nurses with a demanding work schedule or high home demands.

This thesis considered work schedule fit with private life to be located 'outside' the self in the social and work-related contexts of the nurse. It represents the degree to which the work schedule fits with nurses' private life, particularly in relation to leisure time, family situation, social circumstances, sleep, and work-leisure time balance. The work schedule fit with private life was a better job resource for nurses in the one-year follow-up period than work schedule control. Moreover, it was a better resource than personal resources (e.g. active coping style, or healthy lifestyle), which are not predictive for higher participation of nurses working in residential elder care (Chapter 5).

The finding that work schedule fit with private life was a better job resource for nurses within the one-year timeframe than work schedule control (Chapter 5) might be attributed to our observational study design. However, it is in line with other ambivalent findings and problems associated with work schedule control. For example, Nijp et al. (18) found that the effect of work schedule control is mitigated by well-being and motivation. Access to more work schedule control seems important only when employees have a need for such access. Work schedule control might be effective in increasing participation without an actual change in the work schedule or working hours (19). This could imply that providing work schedule control fulfils the basic need of employees to control their environment (20). Moreover, shift workers, and healthcare workers in particular, tend to give high priority to family life and leisure time when scheduling their own shifts (21) and providing almost full control over their schedule might result in more demanding work schedules (19). Furthermore, nurses have to rely on colleagues and supervisors (22) when scheduling their work schedules, and a balance is required between their individual needs and the needs of the unit

(23). Thus, individually focused work scheduling procedures could interfere with team cohesion (24, 25). Therefore, in this way, work schedule control might be experienced by nurses as a threat or a demand, rather than an opportunity to balance work schedule and private life; this is underlined by our findings in Chapter 5.

This thesis has shown that (within the one-year timeframe) work schedule fit with private life can be seen as a stable resource to enhance work engagement and to buffer the effect of work schedule and home demands on emotional exhaustion.

Antecedents of work schedule fit with private life

This thesis not only examined the effects of work schedule fit with private life on participation, but also addressed the question as to what determines work schedule fit with private life. In this thesis, work-related factors such as high social support, low quantitative job demands, high job and work schedule control, the type of work schedule and home-related factors were associated with work schedule fit with private life, irrespective of personal factors such as age, taking care of children, and working history. However, there is a possibility that these variables interact or have a causal chain. Nurses have to negotiate with supervisors and colleagues about their schedule on the long term and may have to swap shifts on short notice. Garde et al. (19) and Beutell (26) found that more work schedule control was directly related to work schedule fit. Thus, there is a possibility that work schedule control leads to more social support via work schedule fit with private life (27).

ICF as a frame of mind to study participation

This thesis has shown that the ICF framework is a useful one to investigate the labour participation of nurses working in residential elder care. This thesis highlight the importance of contextual and home-related factors and health, over and above solely personal factors, to understand the impact on labour participation of nurses working in residential elder care. The ICF framework categorises the origin of the determinants without weighing the relationships between the variables under study (1, 28, 29). Furthermore, the ICF framework addresses the complex interplay between these factors and guided the research aims of this thesis. Therefore, examining the effects of shift work on labour participation from a biopsychosocial perspective using the ICF framework seems a valuable contribution to the biomedical perspective as described by Kant and van Amelsvoort (30). Moreover, there is a need to elucidate the external and personal resources for work-related care and to incorporate the positive outcomes of work to improve our understanding of labour participation (31). This thesis provides knowledge related to these processes.

However, additional theoretical frameworks are required to support the pathways within the ICF framework. Therefore, the COR theory and the related Job Demands-Resource model were used. The COR theory (7) and Job Demands-Resource model (32) assume that: 1) job resources buffer the impact of job or home demands on health problems, 2) job resources predict positive

outcomes, such as motivation, 3) job resources predict motivation, especially when job or home demands are high, and 4) job resources are negatively associated with work-related demands (6, 33).

In this thesis, all four assumptions were (partly) confirmed. Job resources predicted sickness absence duration and episodes via health complaints and were associated with motivation (Chapter 6). Furthermore, resources buffered the negative impact of demanding type of work schedule (Chapter 5); resources were more strongly related to motivational aspects than to health complaints (Chapter 6); and resources were especially important for participation, in terms of work engagement when a work schedule was demanding (Chapter 6). Finally, work schedule fit with private life was negatively associated with work-related demands, such as the type of work schedule, working hours, and work-related demands (Chapter 2 and 3). These findings were in line with the COR theory (7), which proved to be a valid basis for testing work schedule-related job resources (Chapter 5 and 6). Therefore, it appears valuable to examine the participation of nurses working in residential elder care from a resource perspective. Furthermore, our findings also add knowledge to the need to redefine the demands within the Job Demands-Resource model (6). Because work schedule fit with private life was positively related to motivation and negatively to health complaints, this concept can now be categorised as a resource. Therefore, the studies in this thesis show the value of using a resource-oriented approach for research on shift work.

Finally, in relation to the causal model presented in Chapter 6, it can be concluded that sickness absence was mainly explained through work-related and home-related aspects via health. In addition, the findings also confirm (although with some caution) that sickness absence among nurses is mainly health-related rather than motivation-related. This finding is in contrast with other studies (albeit among other work populations) that also showed a path to sickness absence via motivation (34-36). Our findings support the use of work stress models built on resource theories that specifically include home characteristics, such as the work-home resource model (37). It is likely that nurses are intrinsically motivated to work in their profession. However, factors related to the economic recession in 2009 and 2010 might have diminished the relationship between motivation and sickness absence. Although there was a nursing shortage at that time, during a recession health complaints tend to increase, sickness absence rates tend to decrease, and extrinsic motivation to work increases, which might explain the absence of a relationship found in our study (38, 39). On the other hand, employers' flexibility might also decrease during an economic crisis (40), which could lead to less than optimal work schedule fit with private life.

Therefore, although in most theories shift work is generally perceived as a demand that encompasses loss of energy, this thesis shows that the work schedule can be valued positively (within a one-year timeframe) as a resource and not as a demand, if the work schedule fits with the private life of nurses working in residential elder care. Therefore, it is important to examine the participation of nurses working in residential elder care from a resource perspective. Furthermore, the findings in Chapter 2 and 5 imply that work schedule fit with private life is relevant on an

individual level, irrespective of personal variables such as organisational age, chronological age, taking care of children, coping style, and a healthy lifestyle, etc. Work schedule fit with private life can directly influence participation in terms of well-being and motivation. Finally, work-related demands/resources, home-related demands/resources and personal demands/resources are shown to interact and influence nurses’ participation in terms of well-being, motivation and sickness absence. The overall findings of the studies in this thesis are presented in Figure 3.

Figure 3: Extended ICF model (1) applied to labour participation of nurses working in residential elder care (determinants not confirmed in this thesis are shown in light grey italics).

METHODOLOGICAL CONSIDERATIONS

This thesis adds knowledge regarding how to measure the work schedule fit with private life for this specific nursing population within the context of residential elder care. The work schedule was evaluated as a resource by measuring the extent to which the work schedule allows nurses to achieve work goals, reduce job demands, and/or stimulate personal growth and well-being, and/or is linked to the process of creating and maintaining key resources. Similar relationships have been reported by others (41, 42). However, in contrast to our use of the ‘work schedule fit

with private life’ (WSF) scale, these earlier researchers used the preferred work schedule, or the difference between the preferred and the actual work schedule. Furthermore, this thesis did not test whether the WSF scale is sensitive enough to measure the interaction between nurses’ home demands and the work schedule. Nevertheless, an advantage of our measure is that it quantifies the degree of similarities between the preferred and the actual schedule.

The type of work schedule nurses worked in was measured by asking nurses to report the start and end times of their shifts, as well as asking for their actual working hours on a contractual basis. Based on these data a new typology was constructed. This typology resembles (for example) the more extensive typology of Härmä et al. (4) used to assess register-based working time patterns for epidemiologic studies; however, the typology of Härmä et al. included two additional dimensions, i.e. shift intensity and social aspects of working hours. The social aspects of working hours assess the realised and the wished shift, which is similar to our measurement of WSF. Furthermore, it assesses the free time between shifts; this was associated with the typology of work schedules in our research and seems to be a dependent construct. Moreover, it appears that not only the quantity of free time between shifts is important, but also what one does between shifts to recover (43). However, and although not restricted to free time, a healthy lifestyle was not related to participation in terms of well-being and motivation. In addition, to assess the type of work schedule of each nurse a self-report questionnaire was used; however, this could be liable to recall bias. For example, Härmä (44), showed that the validity of self-reported assessment of shift work varied depending on the specific work schedule; in particular, shift work without nightshifts appeared to be imprecise. Therefore, this could have led to underestimation of the effect of these shifts (e.g. the type two work schedule in our studies).

Study sample

The research in this thesis was based on two samples of nurses working in residential elder care. The size of the first sample was relatively small but, with respect to age, gender and education, was comparable with the nursing population at that time in the Netherlands and comparable with the second sample. However, the working hours spent per week was lower in the second sample. The size of the second sample was comparable with, for example, the sample of nurses working in residential elder care used for the Survey among Nursing Employees (WNE, 45) and the statistical power seemed sufficient. Almost no differences were found between the nurses that responded and the nurses who did not (albeit the responders were slightly older). In both samples selection bias cannot be ruled out. If selection bias was caused by dropout, this could have led to an underestimation of the relationships found in our studies.

In addition, in both samples, selection bias through the ‘healthy worker effect’ cannot be ruled out. Less healthy workers might have accumulated less occupational exposure because they had already left the nursing profession or had switched to another type of work schedule (46). There

are three possible manifestations for employees with shift work: 1) Primary selection: in which nursing students or inexperienced young nurses choose not to work in residential elder care or a specific type of work schedule (e.g. three rotating shifts). Selection for shift work seems to be predicted by health and a healthy lifestyle, whereas an unhealthy lifestyle predicted selection into fixed evening or fixed nightshifts. When nurses make a decision to apply for shift work, they probably estimate their ability to withstand a demanding type of work schedule. 2) Secondary selection: in which nurses switch to another type of work schedule or reduce their working hours when their type of work schedule does not match their personal health, or the work schedule fit with private life decreases. 3) Tertiary selection: in which shift workers selectively drop-out from the study population.

If primary selection was present in our studies (47, 48), this could have led to an underestimation of the real associations between the type of work schedule, the work schedule fit with their private life, and participation in terms of well-being, motivation and sickness absence. Also, there appears to be a secondary selection process present in our studies, probably caused by health problems, the type of work schedule, or due to differences in the nurses' life stages; this could also have led to an underestimation of the relationships. In line with Nabe-Nielsen, et al. (49) a shift change to other low demanding types of work schedule seems to occur more frequently among nurses with a type 3 work schedule than among nurses with other types of work schedules. With respect to age, decisions and choices around scheduling seem to be more influenced by lifespan age and less by their own health and well-being, especially for workers with more extensive family responsibilities (13, 14, 50). If tertiary selection is present, this could have led to an underestimation of the relationships found in the present studies. For example, nurses' burnout is associated with leaving their profession (51). Therefore, if these points are in fact relevant, the relationships found in our studies would be an underestimation of the true relationships found in the nursing population.

Timeframe

It is difficult to draw firm conclusions about causality based on data with a one-year follow-up. Each determinant involved might have its own specific time course of cause and effect (52). A timeframe of (minimally) one year should be considered, because a suboptimal period could lead to underestimation of the true effects. Based on the findings of De Lange, Taris, Kompier, Houtman, and Bongers (53), a one-year timeframe was chosen to investigate the effect of the work-related and home-related external and personal factors on participation. Although such a timeframe is preferable, changes might have occurred that were unable to monitor. Also, within this timeframe, a nurse might have changed the type of work schedule which could, in turn, have affected their home demands or work engagement; this could also lead to a change in work schedule. This effect of reversed causation was not measured in this thesis. About 25% of the nurses working in residential elder care changed their roster within this timeframe, whereas 85% stayed in the same

type of work schedule as classified in this thesis (additional analysis). It is unknown when and why these changes occurred between the two time points.

The longer timeframe might explain the absence of a relationship between motivation and sickness absence, in particular sickness absence episodes. For example, nurses who were less motivated could have changed job tasks or adapted their working hours, which could have increased their motivation. Another reason for being cautious about causal inferences is that, although the research model was theoretically based, having at least three waves (preferably using latent growth models) would have enabled a full mediation test of our theoretical model (54) to explain sickness absence duration/episodes. Highly engaged nurses might perceive their work schedule fit with private life differently compared to nurses with low engagement.

External validity

This thesis indicates which nurses could benefit from using the type of work schedule as a resource: especially nurses within residential elder care with demanding work schedules, a demanding home situation, or a high life-span age could use the type of work schedule as a resource. However, because baseline measurements of the first sample were conducted in 2003 and of the second sample in October 2009, for external validity it is important to compare the characteristics of the nurses working in residential elder care when the questionnaire was filled-in to the current population of nurses working in residential elder care. Moreover, these data also need to be compared with the European population of nurses. For this, some specific aspects need to be taken into account, such as the greying of the nursing population, the increasing prevalence of self-employed nurses, nurses with a 'zero-hours contract', flex-workers, and the changing demographics of the clients. Although the mean age of the current population of nurses working in residential elder care in the Netherlands is generally higher, the proportion aged under 35 years and under 55 years is comparable to the sample used for this thesis. Also, there are less female nurses in the current population of nurses working in residential elder care and more of them are working more hours on a contractual basis (55).

With respect to the type of contract, the majority of nurses in the sample used for this thesis had a permanent contract and the remainder had a temporary contract, a minimum-maximum contract, or were on-call. Although the number of nurses with a permanent contract is expected to decrease further in the near future, the number of nurses with a permanent contract were comparable to the current nursing population; according to the Survey Nursing Employees 2016 (56) this situation has consolidated and has slightly decreased recently (55). Self-employed nurses are still mainly absent from the labour market (55), which is in line with a study by De Veer and Francke (57) showing that, among women, the intention to work as a self-employed nurse is low.

In conclusion, despite that changes are expected, the research sample used in this thesis are comparable to the current nursing population in terms of self-employment. However, due to the

current unsecure working conditions, the results emerging from our studies may be underestimated, whilst the amount of possible resources will be overestimated for the current nursing population.

With respect to the European situation, large differences exist with regarding part-time work. The prevalence of part-time work of other European countries differs from that in the Netherlands, which is a leading country in part-time work (58); this also applies to nurses (59). Nurses with a permanent contract were slightly overrepresented compared to other European countries. Moreover, nurses in the Netherlands are still held (mainly) responsible for childcare tasks. The amount of time spent on care tasks (besides child care) was the highest in the Netherlands compared with other European countries. Regarding work-family conflict, in the NEXT study, nurses in the Netherlands scored the lowest compared to other European nurses (59). This is probably because the Netherlands has the highest percentage of informal child care compared to other European countries (60).

Although the prevalence of equal sharing of paid work has increased in the last decade in the Netherlands (61), traditional family supportive policies still exist. Other European countries (e.g. Denmark, Sweden and Finland) have more dual-earner family supporting policies (62); e.g. some Scandinavian countries enable parents to combine work and family and stimulate a more equal sharing of paid and unpaid work (63, 64). These findings imply that extrapolation of the findings with respect to home demands to other European countries requires caution. Nurses working in other European countries might experience more home resources and less home demands.

Because both samples consisted mainly of female nurses, indirect gender differences in daily life-related and work-related stressors might have played a role with respect to sick leave (65, 66), and women are at increased risk for longer sickness absence because of their health (67). Problems with combining work and family are more common for women, which can cause gender differences in sickness absence (68). Furthermore, informal care giving is stimulated by governmental policies and remains primarily a woman's responsibility. In addition, informal caregivers seem to use their free time to fulfil informal care tasks (69). Male employees use their free time differently than female employees (11), e.g. it may be less urgent for them to perform care tasks or informal care. Therefore, it is reasonable to assume that nurses working in residential elder care have become increasingly involved in informal care alongside their paid employment; this applies to both samples included in our studies. Healthcare workers who provide more hours of informal care in their private lives are at risk for mental and physical health problems, more work-home interference, and sickness absence (69-71). Moreover, high job strain and informal care giving predict participation problems with respect to well-being, motivation and sickness absence (72). Our findings might be an underestimation of the current situation of nurses who combine their job and informal care, for whom work schedule fit with private life becomes increasingly important.

Although primarily focusing on night work, according to the Dutch Health Council there is evidence that night work increases the risk of diabetes mellitus and cardiovascular diseases (73). An additional analysis showed that, in the research sample, the prevalence of nurses with a chronic

illness is comparable to that in the general working population (74, 75). However, as mentioned, because our nursing sample is not comparable with the general working population, caution is required when extrapolating the findings of this thesis to other groups.

The research model presented in Chapter 5 seems restricted to study populations with shift work consisting solely of female employees. However, the ICF as a frame of mind proved to be useful for research on participation in terms of motivation, well-being and sickness absence among employees who have some kind of shift work. It recognises the complex interactions that can cause participation problems and, therefore, contributed to the understanding of these interactions among nurses working in residential elder care. Furthermore, the COR theory was used to consider working time arrangements as a resource, and has also proven valuable for research on other populations with shift work and is a valuable attribution to the ICF model (31). Moreover, the study population used for this thesis concerns employees with specific work-related demands, i.e. working with patients or clients, and partially replicated the findings from other study populations (35, 36). Due to the flexibility of working time, the 24-hour economy, and the sharing of paid and unpaid work, the work schedule as a resource will gain importance for other research populations and should be incorporated in future research models. However, although the conceptual model may be applicable to other working populations, the present results on the strengths of the relationships found are mainly useful for female research populations, such as hospital nurses, and home care nurses.

Outlook

As described in the introduction, there have been a number of important changes in health care since the start of the research described in this thesis that might affect the implications of the conclusions of this thesis. Major changes are likely to occur with respect to the job content of nurses in elder care in the Netherlands. In 2015 the Social Support Act (Dutch: WMO) and the Chronic Care Act (Dutch: WLZ) were introduced to replace the Exceptional Medical Expenses Act (Dutch: AWBZ). Because of this, only high-level care is provided by nursing homes. Care for elderly with low-level care needs is no longer provided intramural. Care homes have largely disappeared and extramural care is replaced by informal care and home care. On the other hand, there is increasing demand for especially higher educated nursing personnel and new skills in residential elder care (76, 77). The care demands of clients in residential elder care will increase and will continue to differ between elderly groups, implying that elder care is a highly complex process. Extramurally, higher educated nurses are needed in home care due to the complex care demands in view of the policies to support client self-management strategies. However, the need for higher educated nurses should also be fulfilled by educating the current nursing population. In 2016, according to the Survey among Nursing Employees, about 92% of the current nursing population had a fixed contract (56); this decreased to 81% in 2017 (55). However, the number of self-employed nurses did not change and they were still largely absent. These changes are probably due to the closing

of the care homes. Therefore, no major changes with respect to the nursing population within the remaining nursing homes are expected.

Furthermore, in 2018-2020 a shortage on the supply side is expected in (residential) elder care, especially for nurses with higher educational levels. A larger part of the nursing population will probably work as a self-employed nurse. The working hours of nurses per week will also probably increase. This led the Minister for Health, Welfare and Sport to call for extra healthcare personnel and to use the governmental budget for increasing quality of residential care only on extra personnel. Also, especially older female employees will be expected to perform more informal care tasks, particularly those working 28 hours per week or less (10). This implies that the future population of nurses will comprise older nurses performing more informal care tasks, and higher educated nurses performing more complex care tasks; however, this could be a risk for increased nurse attrition. Perhaps the recent changes could cause a shift from the problem to home care nursing.

Recently, several surveys have shown that the work schedule and work related demands are still one of the main reasons for leaving nursing, that the shortage on the labour market is still a concern, as is combining work and private life of nurses. These consequences, caused among other things by the developments described earlier, show that the relevance and necessity of the work schedule and the fit between the work schedule and nurses' private life have only increased since the data were collected. There are no reasons to assume that the type of relationships between the variables has changed, but the strengths might have. The conclusions of this thesis have thus gained importance.

Conclusions regarding external validity

In summary, despite the current and (probable) future changes in elder care, the research findings in this thesis will still be valid in the near future for nurses working in Dutch residential care or home care for the elderly. Furthermore, the need for more working hours and higher educated nurses, in combination with comparable working conditions, will be required for a part of the current nursing population working in elder care. Because the samples used in the present studies differ from the current European nursing population, it is questionable whether the strengths of the relationships found in this thesis are entirely applicable for other European nurses. Nevertheless, our work emphasises the importance of the 'work schedule fit with private life' in the near future for, in particular, the Dutch situation.

RECOMMENDATIONS FOR FUTURE RESEARCH

The current work has provided new insights on the work schedule as a resource with respect to participation, in terms of motivation, well-being and sickness absence of nurses working in

residential elder care. It also shows the role of the home domain with respect to participation. To further investigate these new insights, the following recommendations are made for future research.

One important research line should focus on 'work schedule fit with private life' (WSF) with respect to nurses' participation. Because the findings in this thesis are based on an observational design, implementing measures to increase work schedule fit with private life will not necessarily lead to a higher participation level of nurses. Therefore, an experimental design is recommended to further investigate this topic. Also, the long-term effects of WSF on, especially health need further investigation; for this, a prospective cohort study is required with a longer follow-up period. Although a one-year timeframe is preferable (53), shorter time intervals are also needed to control for the effect of work schedule changes on participation. To further test the mediation model used in this thesis, a multi-wave model should be used with at least three waves.

Second, regarding the discussion on gender, the instrument that we developed to measure WSF could only be used for this specific nursing context; whether this instrument is applicable to other populations requires further investigation. Although the WSF scale has proven reliable and valid, studies are needed to further elucidate its construct validity and predictive value. Others researchers have shown that it is possible to compose a short questionnaire that predicts employees at risk for participation in terms of sickness absence (78, 79). However, because home demands and WSF interact, it is unknown whether the WSF scale has sufficient sensitivity to measure this. Therefore, the WSF scale should be tested on different levels of home demands in different types of work schedules.

How nurses actually accomplish work schedule fit with private life needs further research. As described, the ICF model addresses the complex interplay between work-related, home-related and personal factors. For example, nurses with more social support (at home or at work) in combination with more work schedule control might be better able to adapt their actual schedule to their private life. In that case, WSF is a product of the interaction between work schedule control and social support. However, the interaction between work-related factors and home-related factors remains unclear. Qualitative research should further elucidate the role of work schedule control and social support with respect to WSF and refine the present findings and those of, for example, Swanberg, McKechnie, Ojha, and James (27).

This thesis enables to improve or challenge the current conceptual frameworks used in studies on shift work (2, 80-83) which mainly focus on the undesirable impact or negative consequences (especially fatigue) of shift work. In line with the development to use work stress models in shift work research (84), it is important to include resources that help employees withstand the demands of the work schedule. Moreover, in view of a new approach in defining health (85, in short: the ability to adapt and self-manage), the inclusion of positive outcomes with respect to participation (and not only health complaints or fatigue) could be encouraged.

This thesis and earlier research shows that the youngest nurses working in type 3 schedule, (rotating three shift pattern) and with a low lifespan age are an important focus group with respect to participation. Unfortunately, studies on the youngest nurses and/or intervention studies are lacking, and little attention is paid to the work schedule as a resource during nurses' vocational education. To monitor these groups, a cohort study with a longer time interval is needed, preferably starting during nurses' training/education. Moreover, a cohort study allows to control for the 'healthy worker effect', i.e. the result of selection into work (i.e. unhealthy workers are less likely to start to work irregular hours) and selection out of work (i.e. those with health problems are more likely to drop out). For example, exit interviews or interviews when nurses change their work schedule could be used. An example of such a cohort study which started during nurses' student period is that of Bakker, Kox and Roelofs, (86). Unfortunately, as the results of this thesis and research among students has shown (87), they do not focus on the work schedule fit with private life or work schedule-related resources to increase participation. Finally, the research model used (Chapter 6) and whether work schedule fit with private life is valued as a resource, needs to be validated in other study populations.

PRACTICAL IMPLICATIONS/RECOMMENDATIONS FOR POLICY AND PRACTICE

This chapter aims to translate the findings into preventive strategies for both practice and policy.

First, it is recommended to monitor nurses' participation status in terms of their health status, and sickness absence. This thesis shows that nurses' sickness absence was health related. It is important to emphasise that work schedule features could affect health and well-being mediated by a mismatch of sleep-wake cycles and other important biological rhythms, as well as by sleep problems, lifestyle changes, or disturbed family and social life. Nurses tend to focus more on short-term benefits and less on long-term consequences, such as their own health. This raises the following concern: when nurses' focus primarily on family/social life and other short-term benefits when they schedule their own shifts, this might increase the number of working hours per shift. Then, participation problems might emerge on the longer term due to ignoring other important processes, such as sleep deprivation, insufficient recovery, and health. Therefore, monitoring should be undertaken by elder care organisations on a regular basis.

Furthermore, it is recommended that work schedule fit with private life be aimed for by residential elder care organisations to decrease home demands and increase participation of nurses. Moreover, elder care organisations should aim for work schedule fit with private life, rather than work schedule control, as a temporary measure to reduce emotional exhaustion or improve work engagement of nurses. It should be a general subject for discussion between supervisors and nurses to establish the best fitting work schedule. Although the value of the WSF scale as a practical tool is not yet evidence-based, the application of the WSF scale on a regular basis should

be used in case of primary preventive actions. This could be achieved by using it (for example) during performance interviews with supervisors, or when nurses request a work schedule change. The focus should be on nurses with a high lifespan age or high home demands, nurses working in a type 3 work schedule, or the youngest nurses. However, to do so, future research should focus on the further (predictive) validation of the WSF scale. Because selection effects into shift work are present, intervention mapping should be used to develop preventive strategies. Nurse students should be better prepared and equipped for working shift work. Therefore, the WSF scale could be used, for example, during their practical internship. Nurse students should be informed how to increase their work schedule fit with their private life.

It is recommended that company physicians use certain types of work schedules as a tool for temporary solutions, especially type 1 and 5 work schedules. In this way it could be used as a so-called Human Resource Bundle (88), i.e. specific human resource practices that help employees sustain their level of functioning in the face of (e.g.) new home demands, or to return to previous levels of functioning. This Human Resource Bundle is applied on an individual level for nurses with participation problems. Furthermore, it could be used for human resource managers to enhance team performance. Therefore, achieving a work schedule fit with private life is advantageous for both employers and employees.

It is recommended that, according to the findings in this thesis, it should be the employers' and nurse managers' responsibility to enhance work schedule fit with private life to increase nurses' participation in terms of motivation and well-being. This thesis shows that care organisations should focus on providing job resources and not on personal resources, such as an active coping style and a healthy lifestyle. According to the Dutch Working Conditions Act (Arbowet) (89), employers are obliged to facilitate employees to prevent health problems. According to Robroek et al., about 90% of employees thinks that it is good that the employer tries to improve their health, and only 20% thinks that this interferes with their privacy (90). Employers are obliged to promote and facilitate healthy behaviour on the work floor. For nurses working in residential elder care, participation should be a shared employer-employee responsibility.

Another way for nurse managers to facilitate nurses work schedule fit with private life could be the family-oriented supervisor behaviour (FSSB) Intervention (22). This is supported by the findings in Chapter 5 and 6, i.e. that home demands and job resources are related to participation in terms of motivation, well-being and sickness absence. This training and self-monitoring intervention for supervisors increases their family supportive behaviours (22); research shows that, especially emotional and instrumental support, role modelling behaviour of supervisors, and proactively creative work-family management were effective with respect to nurses' participation (91).

In the light of successful implementation of these recommendations, some aspects should be considered with respect to nurses with shift work. It is important to emphasise that, because the present research had a one-year timeframe, the longer-term effects of increasing work schedule fit

with private life are unknown. Furthermore, working in different types of work schedules seems a risk factor for low availability of workplace (health) interventions. Participation levels are generally low during workplace interventions and are less likely to be reached by shift workers compared to dayworkers (92). Also, some nurses seem to be reached by implementation of stress-reducing activities and reorganisation of the working hours; about 30-50% has participated in improvements (92). Fixed evening, fixed nights and variable shifts without nights need special attention. Other factors that contribute to participation are the quality of the supervisors, health complaints of nurses, and their beliefs (92, 93).

Being self-employed and responsibility

A different situation arises when nurses are self-employed: i.e. either the self-employed nurse is hired by an elderly care organisation, or she works independently. In the first situation, the organisation is responsible for the (psychosocial) work environment; in that situation, it is suggested to follow the recommendations mentioned above. In the latter situation, the self-employed are responsible for themselves; in that case, adequate knowledge and awareness is required to self-regulate appropriate behaviour, and the consequences, on the short and long term.

CONCLUSION

The work presented in this thesis contributes to the understanding of the work schedule as a resource for nurses working in residential elder care. Although several points need further clarification and additional studies are recommended, the work schedules of nurses working in residential elder care should be acknowledged as a resource to increase participation in terms of motivation, well-being and sickness absence. If, according to the nurses, the work schedule fits with their private life, this tends to maintain or increase their participation in terms of well-being, motivation, and sickness absence.

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SUMMARY

In this thesis the results are described of the “Time for Care; Care for Time” study which focuses on the role of the work schedule, and the fit between the work schedule with private life as a resource in relation to participation in terms of well-being, motivation and sickness absence of nurses working in residential elder care.

Chapter 1 provides a general introduction on the background on participation of nurses working in residential elder care in terms of motivation, well-being and sickness absence in the Netherlands. There is an ongoing need to focus on nurses already working in residential elder care and their sustainable employment. Nursing in residential elder care is inextricably bound with shift work that is still one of the main reasons why nurses are dissatisfied with their job. The negative effects of shift work on health and labour participation is well documented, but studies on the specific effects of shift work for nurses working in residential elder care are scarce. Labour participation is a multifaceted and complex phenomenon which may involve i) work-related factors, ii) personal factors, and iii) health-related factors. It is known that work-related demands play a role in adverse work outcomes, and are likely to increase in the near future for nurses. However, despite the growing interest in the benefits of work, such benefits have hardly been reflected in conceptual frameworks in research on nurses working in residential elder care. A central hypothesis of this thesis is that certain resources have the potential to buffer the negative effect of work schedule-, home- and person-related demands on the participation problems of nurses working in residential elder care. The Conservation of Resources theory incorporated into the extended International Classification of Functioning, Disability and Health (the ICF-model), was considered to be a suitable frame of mind to study the labour participation of these nurses. Therefore, this thesis focuses on work-, home- and person-related resources with a special focus on the work schedule and the work schedule fit with private life. It will be investigated whether a better fit between work schedule and private life could possibly serve as a solution for the labour participation problems of nurses.

Chapter 2 describes a cross-sectional survey among 144 nurses working in residential elder care. The research aim was to investigate if the work schedule fit with private life mediates the relation between work and home characteristics on the one hand and health on the other. A new scale to measure work schedule fit with private life was presented. All work characteristics, but no home characteristics, were associated with work schedule fit with private life. The work characteristics “job demands” and the home characteristics “autonomy at home” and “home demands” were associated with health. Work schedule fit with private life did not mediate between work/home characteristics and health. Those reporting more social support, lower job demands and more job autonomy perceived a higher work schedule fit with private life. Furthermore, the new scale to measure work schedule fit with private life (WSF) appeared to be a valid and reliable instrument.

Chapter 3 using a different dataset from the one used in chapter 2, describes a cross-sectional study among 498 nurses working in residential elder care in which a new typology of work schedules was developed to assess the work schedules of nurses with shift work and to validate this typology. Furthermore, an additional aim was to elucidate what the characteristics were of the nurses working in different types of work schedules. Five main types could be distinguished based on predetermined requirements and frequencies. Nurses working in these types of work schedules differed significantly with respect to socio-demographic, and family characteristics and their appraisal of their work schedule. Especially nurses with type 3 schedules (rotating three shift pattern) differed from the other nurses. They were on average the youngest group and worked on average the least years in the current job. They experienced the least fit of their work schedule with their private life, worked the most hours on average, commuted the most minutes per workday and had the fewest days off in between shifts. A typology of five main types of work schedules was thus proposed to be used in future research. Content validity of the typology was sufficient and the new typology seemed useful for research on work-related aspects of nursing.

Chapter 4 describes a cross-sectional study using the same research sample as in chapter 3 with the aim to explore differences in participation in terms of well-being, motivation and sickness absence between nurses working in the different types of work schedules and to establish to what extent different operationalizations of age might explain differences with respect to participation. Age was operationalized as chronological age, organisational age, life-span age, and functional age. Nurses’ participation in terms of well-being, motivation and sickness absence appeared to be mainly related to differences between the types of work schedule rather than age. Fixed early shifts were characterised by the most positive aspects of participation in terms of well-being, motivation and sickness absence, and three rotating schedules by the worst aspects. To improve participation, organisations should implement a system in which nurses with different types of work schedules are monitored in combination with their life-span perspective.

Chapter 5 describes a longitudinal study among 247 nurses working in residential elder care including two waves of data collection with a one year follow-up using self-report questionnaires. The aim was to examine whether personal (active coping and a healthy lifestyle) and job resources (work schedule control and work schedule fit with private life) predict work engagement and emotional exhaustion, and whether interactions between personal resources/job resources and work schedule demands, predict work engagement and emotional exhaustion of these nurses. Moderated structural equation modelling was conducted to analyse the interactions between personal and job resources on the one hand, and work schedule demands on the other hand. Nurses suffer less from decreasing work engagement and emotional exhaustion due to work schedule demands when their work schedules fit with their private lives. Work schedule control did not buffer, but rather strengthened the positive relationship between weekly working hours and emotional exhaustion one year later. Job resources appeared to be more important for nurses’ well-being than personal

resources were. The findings in this chapter highlight the importance of the fit of a work schedule with nurse's private life, if the work schedule is demanding.

Chapter 6, the final study describes a longitudinal study using structural equation modelling analyses with a one year follow-up among 365 nurses based on survey data and registered sickness absence data. The aim was to elucidate the role and pathways of home demands, home and job resources with respect to sickness absence among nurses working in residential elder care. In addition, it was examined whether these relationships were mediated by health and motivation. Structural equation modelling analysis was performed on registered sick leave data to examine which characteristics predict registered sickness absence periods and duration one year later. More job resources, like work schedule fit with private life, and more home demands predicted sickness absence one year later and were mediated through nurses' health rather than through nurses' motivation. Job resources were associated with higher work related motivation. Adapting the work schedule to the employees' private life and reducing home demands seem good measures to reduce health-related sickness absence within one year.

In **Chapter 7** a discussion is provided of the main findings of this thesis, alongside with methodological considerations and implications for research and practice. This thesis contributes to the understanding of the work schedule as a resource for nurses working in residential elder care. Evidence has been found that the work schedules of nurses working in residential elder care should be acknowledged as a resource to increase participation in terms of motivation, well-being and sickness absence. Nurses working in residential elder care perceived their home situation as a demand and not a resource, and home demands together with job resources predicted more sickness absence via more health complaints. This thesis shows that sickness absence of nurses working in residential elder care among nurses is related to health problems rather than to lack of motivation for work. This again emphasises - with respect to labour participation - the importance of focusing on nurses' lifespan age, rather than on chronological or organisational age. Finally, it appears valuable to examine the participation of nurses working in residential elder care from a resource perspective.

Strengths of this research include the longitudinal design with a one-year timeframe and two new instruments: the WSF (work schedule fit with private life) to measure the work schedule fit with private life and to measure the type of work schedule of nurses working in residential elder care. The present results on the strengths of the relationships found are mainly useful for female research populations. Another limitation of this research is that due to the observational design causal processes still need to be elucidated. Second, forms of healthy worker effect may have been present: those nurses best adapted to shiftwork manage to keep working.

In conclusion, the findings of this thesis have implications for future research and practice. An example of an implication for research is an experimental design to further investigate the effect of work schedule fit with private life as a resource with respect to work participation for nurses

working in residential elder care. The long-term effects of work schedule fit with private life on health need further investigation in a prospective cohort study with more than two measurements and a follow-up period longer than one year. For preventive strategies for both practice and policy, it is recommended to monitor nurses' participation status in terms of their health status, and sickness absence. It is recommended that work schedule fit with private life should be aimed for by residential elder care organisations to decrease participation problems of nurses. Occupational physicians might recommend change of types of work schedules to prevent health problems and sickness absence in individual nurses.

SAMENVATTING

In dit proefschrift worden de resultaten beschreven van de "Care for time; time for Care"-studie waarin de rol van werktijdregelingen (aantal uren en verdeling van de uren over de dag en week) van verplegend en verzorgend personeel werkzaam in residentiële ouderenzorg centraal staat. Meer specifiek wordt in dit proefschrift de bestudeerd of de mate waarin het werkrooster bij het privéleven aansluit (hierna te noemen 'de ervaren *fit* tussen rooster en privéleven') een mogelijke hulpbron is om arbeidsparticipatie te verbeteren.

In **Hoofdstuk 1** wordt een overzicht gegeven van de motivatie, het welzijn en het ziekteverzuim (aspecten van arbeidsparticipatie) van verplegend en verzorgend personeel, dat werkzaam is in de ouderenzorg (verpleeg- en verzorgingshuizen) in Nederland. Motivatie, welzijn en ziekteverzuim worden gezien als belangrijke aspecten van arbeidsparticipatie nu en in de toekomst, dus van duurzame inzetbaarheid. Verpleging en verzorging in de ouderenzorg zijn onlosmakelijk verbonden met onregelmatige werktijden. Werktijden en roosters zijn echter belangrijke redenen voor ontevredenheid van verplegend en verzorgend personeel met hun werk. De negatieve effecten van werktijden op de gezondheid en arbeidsparticipatie zijn goed onderzocht, maar studies over de specifieke effecten van werktijdregelingen voor verplegend en verzorgend personeel werkzaam in de ouderenzorg zijn schaars. Arbeidsparticipatie is een veelzijdig en complex fenomeen dat verklaard kan worden door i) werkgerelateerde factoren, ii) persoonlijke factoren en iii) gezondheidsgerelateerde factoren. Het is bekend dat werkgerelateerde taakeisen (factoren) een rol spelen bij de ongunstige werkgerelateerde uitkomsten en het is aannemelijk dat voor verplegend en verzorgend personeel deze taakeisen alleen maar zullen toenemen in de nabije toekomst. Ondanks de toegenomen belangstelling voor de positieve aspecten van arbeidsparticipatie, worden deze nauwelijks weerspiegeld in de conceptuele kaders in het onderzoek naar verplegend en verzorgend personeel werkzaam in de ouderenzorg. In dit proefschrift is de *Conservation of Resources*-theorie gecombineerd met de *International Classification of Functioning, Disability and Health* (de ICF). Hieruit is een denkkader geconstrueerd om de arbeidsparticipatie van deze verpleegkundigen en verzorgenden te bestuderen. De centrale hypothese van dit proefschrift is, dat bepaalde hulpbronnen de potentie hebben om het negatieve effect van taakeisen op arbeidsparticipatieproblemen te verminderen. Dit proefschrift concentreert zich daarbij op werkgerelateerde, thuisgerelateerde en persoonlijke hulpbronnen waarbij onderzocht wordt of een betere ervaren *fit* tussen rooster en privéleven een mogelijke oplossing zou kunnen zijn voor de arbeidsparticipatieproblemen van verplegend en verzorgend personeel.

In **Hoofdstuk 2** wordt een cross-sectioneel onderzoek beschreven onder 144 verplegenden en verzorgenden die werkzaam zijn in de ouderenzorg. Het doel van het onderzoek was om te onderzoeken of de ervaren *fit* tussen rooster en privéleven de relatie medieert tussen werk- en thuiskenmerken enerzijds en gezondheid anderzijds. Er werd eerst een nieuwe schaal ontwikkeld om de ervaren *fit* tussen rooster en privéleven te meten. Alle werkkenmerken bleken samen

te hangen met de ervaren *fit* tussen rooster en privéleven, maar thuiskenmerken hangen niet samen met deze *fit*. De werkkenmerken "taakeisen" en de thuiskenmerken "autonomie thuis" en "thuisstaken" hingen samen met de ervaren gezondheid van verplegenden en verzorgenden. De ervaren *fit* tussen rooster en privéleven medieerde niet de relatie tussen werk- en thuiskenmerken en gezondheid. Degenen die meer sociale steun, minder taakeisen en meer autonomie ervaren, hadden een betere *fit* tussen rooster en privéleven. Bovendien bleek de nieuwe schaal voor het meten van de *fit* tussen rooster en privéleven een valide en betrouwbaar instrument te zijn. Deze schaal werd in hoofdstuk 2 nog de SIW (*Satisfaction with Irregular Working times*) genoemd, en wordt in het Nederlands aangeduid met het acronym PRoF (Privé - Rooster Fit; zie appendix 2).

In **Hoofdstuk 3** is een andere dataset gebruikt dan die in hoofdstuk 2. In hoofdstuk 3 wordt een cross-sectioneel onderzoek beschreven onder 498 verplegenden en verzorgenden werkzaam in de ouderenzorg. Daarin is een nieuwe typologie van roosters ontwikkeld en gevalideerd om de roosters van verplegend en verzorgend personeel met onregelmatige werktijden binnen de ouderenzorg te kunnen classificeren. Het doel was om na te gaan wat de kenmerken zijn van de verplegenden en verzorgenden werkzaam in elk type rooster. Hiervoor zijn de oorspronkelijke typen eerst gecategoriseerd in vijf hoofdtypen op basis van vooraf opgestelde eisen. Verplegenden en verzorgenden binnen de vijf typen verschilden aanzienlijk met betrekking tot sociaal-demografische en gezinskenmerken en hun waardering van het rooster. Vooral verplegend en verzorgend personeel met type 3-roosters (drie-roterende diensten) verschilden van de verpleegkundigen met de andere typen roosters. Ze waren gemiddeld de jongste groep en werkten de minste jaren in de huidige baan. Ze ervoeren de laagste *fit* van hun rooster met hun privéleven, werkten gemiddeld de meeste uren, hadden de langste reistijd per werkdag en hadden de minste vrije dagen tussen de diensten door. De inhoudsvaliditeit van de typologie was voldoende en de nieuwe typologie lijkt bruikbaar voor onderzoek naar arbeidsgerelateerde aspecten van verpleging en verzorging in de ouderenzorg.

In **Hoofdstuk 4** wordt een cross-sectioneel onderzoek beschreven met dezelfde onderzoekspopulatie als in hoofdstuk 3. Het doel was om 1) de verschillen in arbeidsparticipatie op het gebied van welzijn, motivatie en ziekteverzuim te onderzoeken tussen verplegend en verzorgend personeel werkzaam in de verschillende typen roosters, en 2) in welke mate leeftijd eventuele verschillen in arbeidsparticipatie verklaart. Leeftijd werd geoperationaliseerd als: chronologische leeftijd, organisatieleeftijd, leeftijd van de privésituatie (hoe op een punt in hun levensloop de privésituatie is ingericht) en de leeftijd van de gezondheid. De arbeidsparticipatie (motivatie, welzijn en ziekteverzuim) van verplegend en verzorgend personeel bleek vooral samen te hangen met type rooster, in plaats van met leeftijd. Alleen de leeftijd van de privésituatie was gerelateerd aan motivatie, welzijn en ziekteverzuim. Vaste vroege diensten werden gekenmerkt door de meest positieve aspecten van arbeidsparticipatie (motivatie, welzijn en weinig ziekteverzuim), en

1 Zie o.a.: Nauta A, De Lange AH, Görtz S. Lang zullen ze leven, werken en leren. Een schema voor het begrijpen en beïnvloeden van inzetbaarheid gedurende de levensloop. *Gedrag en Organisatie*. 2010;23(2):136-57

drie-roterende diensten met de meest slechte aspecten. Om de arbeidsparticipatie te verbeteren, zullen organisaties binnen de ouderenzorg een systeem moeten implementeren waarin verplegend en verzorgend personeel een rooster krijgen dat past bij hun leeftijd van de privésituatie.

In **Hoofdstuk 5** wordt een longitudinaal onderzoek beschreven onder 247 verplegenden en verzorgenden werkzaam in de ouderenzorg. Met een *follow-up* van één jaar werden met behulp van vragenlijsten data verzameld. Het doel was om te onderzoeken of persoonlijke hulpbronnen (actieve coping en een gezonde levensstijl) en werkgerelateerde hulpbronnen (controle over werktijden en de ervaren *fit* tussen rooster en privéleven) bevoegenheid en emotionele uitputting voorspellen, en of interacties tussen deze hulpbronnen en type rooster, bevoegenheid en emotionele uitputting voorspellen. *Moderated structural equation modelling* werd gebruikt om de interacties tussen persoonlijke en werkgerelateerde hulpbronnen en een veeleisend rooster te analyseren. Verplegend en verzorgend personeel heeft minder last van de afnemende werkbevoegenheid en emotionele uitputting als gevolg van de eisen van het werkrooster wanneer het rooster aansluit bij het privéleven. De mate van invloed op de planning van het rooster verminderde niet, maar versterkte juist de positieve relatie tussen de hoeveelheid gewerkte uren en de emotionele uitputting van verplegenden en verzorgenden een jaar later. Werkgerelateerde hulpbronnen bleken dus belangrijker te zijn voor motivatie en welzijn van verplegend en verzorgend personeel dan persoonlijke hulpbronnen. De bevindingen in dit hoofdstuk benadrukken het belang van werktijdregelingen voor verplegend en verzorgend personeel, zeker als het rooster veeleisend is.

In **Hoofdstuk 6**, wordt een longitudinaal onderzoek beschreven met een follow-up van 1 jaar bij 365 verplegenden en verzorgenden op basis van vragenlijsten en geregistreerde ziekteverzuimgegevens. Het doel was om de rol te verduidelijken van thuistaken, thuisgerelateerde hulpbronnen en werkgerelateerde hulpbronnen met betrekking tot ziekteverzuim. Daarnaast werd onderzocht of deze relaties werden gemedieerd door gezondheid en motivatie. *Structural equation modelling* analyse werd uitgevoerd om te onderzoeken welke kenmerken het aantal geregistreerde ziekteverzuim perioden en verzuimduur een jaar later voorspelden. Werkgerelateerde hulpbronnen, met name de *fit* tussen rooster en privéleven en meer taakeisen thuis voorspelden ziekteverzuim een jaar later. De gezondheid en niet de motivatie van verplegend en verzorgend personeel was hierbij de mediërende factor. Werkgerelateerde hulpbronnen waren gerelateerd aan een hogere werkgerelateerde motivatie, maar motivatie had geen relatie met ziekteverzuim. Het verhogen van de *fit* tussen rooster en privéleven van verplegend en verzorgend personeel en het verlagen van de taakeisen thuis lijken dus een goede maatregelen om ziekteverzuim binnen een jaar te verminderen.

In **hoofdstuk 7** worden de belangrijkste bevindingen van dit proefschrift besproken, en methodologische overwegingen en implicaties voor onderzoek en praktijk beschreven. Dit proefschrift draagt bij aan het besef dat werktijdregelingen als hulpbron kunnen dienen voor verplegend en verzorgend personeel werkzaam in de ouderenzorg. Er is bewijs gevonden dat een *fit* tussen rooster en privéleven hun arbeidsparticipatie in termen van motivatie, welzijn en minder ziekteverzuim, kan

verhogen. Verplegend en verzorgend personeel beschouwen hun thuissituatie als een taakeis die energie vergt en niet als een hulpbron. Dit proefschrift laat zien dat het ziekteverzuim van verplegend en verzorgend personeel werkzaam in de residentiële ouderenzorg voornamelijk gerelateerd is aan gezondheidsklachten en niet aan gebrek aan motivatie. Wat de arbeidsparticipatie betreft, is in dit proefschrift nogmaals het belang benadrukt van het focussen op de leeftijd van de privésituatie van verplegend en verzorgend personeel, in plaats van op een chronologische leeftijd of leeftijd van de professionaliteit. Ten slotte lijkt het waardevol om de arbeidsparticipatie van verplegend en verzorgend personeel werkzaam in de ouderenzorg vanuit een perspectief te benaderen en te onderzoeken waarin naast taakeisen ook hulpbronnen centraal staan.

Sterke punten van dit onderzoek zijn het longitudinale ontwerp met een jaar *follow-up* en twee nieuwe instrumenten: de PRoF (Privé-Rooster *Fit*) voor het meten van de *fit* tussen rooster en privéleven en een classificatiesysteem voor onderzoek om roosters terug te brengen tot vijf hoofdtypen. De huidige resultaten over de sterkte van de gevonden relaties zijn vooral nuttig voor vrouwelijke onderzoekspopulaties werkzaam in zorg en verpleging. Een beperking van dit onderzoek is dat - als gevolg van de observationele opzet -, causaliteit nog verder gevalideerd moet worden. Ten tweede waren mogelijk vormen van een *healthy-worker effect* aanwezig: juist het verplegend en verzorgend personeel dat het best aangepast is, aan bijvoorbeeld de onregelmatige werktijden, blijft werken.

Concluderend hebben de bevindingen van dit proefschrift implicaties voor toekomstig onderzoek en praktijk. Een voorbeeld van een implicatie voor onderzoek is een experimentele onderzoeksopzet om het effect van de *fit* tussen rooster en privéleven verder te onderzoeken. De langetermijneffecten van de *fit* tussen rooster en privéleven, met name op de gezondheid, moet verder worden onderzocht in een prospectieve cohortstudie met meer dan twee metingen en een follow-up periode langer dan een jaar. In het kader van preventieve strategieën voor zowel de praktijk als voor beleid, wordt aanbevolen aan leidinggevend in de verpleging en verzorging om de motivatie, het welzijn en het ziekteverzuim structureel op de agenda te plaatsen tijdens formele momenten en tijdens informele momenten oog te hebben voor de relatie tussen rooster en welzijn en motivatie. Het wordt aanbevolen dat verpleeghuizen werktijdregelingen hebben waarmee een verplegende of verzorgende een rooster kan kiezen dat past bij haar privéleven. Hierdoor kan de gezondheid en motivatie vergroot worden en het verzuim verlaagd. Ook bedrijfsartsen kunnen verandering van rooster aanbevelen om hiermee gezondheidsproblemen en verzuim te voorkomen.

VALORISATION

This thesis focuses on the fit between the work schedule and private life, which is studied as a potential resource in relation to work participation. The current work has provided new insights that the work schedules indeed could be a resource to improve work participation, in terms of motivation, well-being and sickness absence of nurses working in residential elder care. It also shows the role of the home domain as a domain that threatens work participation. Despite the results of this research being gathered in an observational study, several findings can potentially be valorised.

What should be valorised?

First, as mentioned above, one solution to increase work participation could be to optimise the fit of the work schedule with an individual nurse's private life. This thesis underlines that it is important that a nurse has a work schedule that, according to her, fits with her private life to increase well-being and motivation. This fit with private life could, for example, be discussed with (HR) supervisors and nurse managers. If the nurse has health complaints, or is already absent, the occupational physician can advise that the nurse should have a work schedule that fits better with her private life. To get more insight into that fit, the employee can first complete the WSF questionnaire ('work schedule fit with private life'), which is described in chapter two and is available from the authors in English and in Dutch (1). Ultimately, this instrument might be processed as E-health application so that nurses can monitor and adjust their fitness on regular bases.

Second, the new typology of work schedules presented in this thesis could be introduced in the context of human resource practices. Some types of work schedules (e.g. type 3 rotating work schedule) seem more demanding than for example type 1 work schedule (which is a fixed early shift). Firstly, the typology can be used to identify risk groups for reduced work participation, which seem to be the nurses working in constantly in rotating work schedules (type 3). These nurses are in need of more support on dealing with irregular working hours and its consequences and combining work and private life. As the majority of young nurses work in type 3 schedules, human resources management easily overlooks this risk group.

Secondly, it can be used in the context of job crafting (2): nursing and care staff working in residential elder care homes can adapt their work environment to their needs. Job crafting seems to be a dynamic process between the person and the environment. In particular for nurses, changing to another type of working time arrangement may be a mean to optimise work participation during different phases of the lifespan. These are examples of so-called HR Bundle of 'accommodative' practices which are specifically aimed at 'sparing' (i.e. giving fewer obligations and more privileges to) workers or bundle HR practices that could help nurses to maintain their current levels of functioning in the face of new challenges, or to return to previous levels after a loss.

The insights from this thesis that, in addition to job resources, home demands are related to, or can influence, work participation, also provides input for interventions among care workers in nursing homes. In training or in workshops by for example consultancy companies, the individual reduction of home demands must be part of group and individual training sessions. Different adaptive strategies to improve work-life balance can be taught and implementation of these strategies in individual lives be supported.

Because in the current research no influence was found of a healthy lifestyle and work time control on work participation, it seems to be unnecessary to focus on this to improve work participation in the short term. This thesis also emphasizes the importance of health complaints with respect to work participation. There is an ongoing discussion on responsibility for employees' well-being, but it should be monitored by the employer on a regular basis. This is in line with our findings that job resources seem more important to decrease sickness absence than personal resources.

Further, to improve work participation of nurses, more attention should be paid to notice (early signs of) emotional exhaustion, general fatigue, psychosomatic health complaints, lack of work engagement, and negative work-home interference. This can be done informally and in performance interviews in which the fit with the work schedule is also a central point. This requires that supervisors are trained to register these signs and in starting an (in)formal conversation on these signs and on solutions with the nurse. There are indications that such supervisor behaviour is an important factor that strongly influence or prevent the consequence of work related demands (3-5). In a more formalized way, these complaints can be checked during health checks, but again such check needs to be followed by a conversation on solutions. This thesis and earlier research show that the youngest nurses working in type 3 schedule, (rotating three shift pattern) or nurses with a low lifespan age are an important group to focus on with respect to work participation. Irregular working hours are still an important reason for nurses to leave the job. Students also expect that it will contribute to problems in social life, health and performance after their transition to longer and irregular working hours. However, during the study little attention is paid to working in irregular working hours. Therefore, it seems useful to prepare students for irregular working hours during their working phase (6). This problem has been confirmed in qualitative research by a HAN-Sport Studies student (7). Recent American research (6) shows that nursing students need support during their education to deal with irregular working hours in relation to their personal performance. Such support could take place by workshops, educational units and / or as a point of attention during internship interviews. The WSF questionnaire could serve as input for organizing workshops and directing internship interviews.

How it was valorised

During the PhD research, several activities were performed to valorise the findings of this research:

- First, the main findings were reported during the two moments of data collection to the HR-managers of the participating organizations and, via newsletters, reported to the nursing and care staff of the participating residential elder care organizations.
- Second, both instruments (the WSF and the new typology of work schedules) were used in a questionnaire that was implemented for educational purposes for Bachelor students within the HAN University of Applied Sciences within the work and health theme [Healthy Business] to assess the type of work schedule and the fit with private life of employees from different types of labour organizations.
- Third, the results from the two research waves were presented during: Symposia of Shiftwork and working Time 2011 and 2015 attended by professionals from science, consultancy firms and practice organizations; during the 15th Conference of the European Association of Work and Organizational Psychology in 2011, and during the Sustainable Employability conference: Challenges for HRM Innovation 2013.
- Fourth, practical recommendations have been processed based on chapter five for the magazine for occupational and insurance medicine [Tijdschrift voor Bedrijfs- en Verzekeringsgeneeskunde, TBV] and the questionnaire has been used in another PhD trajectory in the US.
- Fifth, manuals for using the WSF questionnaire in Dutch and English were developed, with cut-off points based on the 25th and 75th percentiles.
- Sixth, the WSF questionnaire was made available for use by "Bevlogenleiderschap.nl", a consultancy organization, for a training in management life and vitality in health care ["Leidinggeven aan bevlogenheid"].

It is important for the valorisation to realize that the context in the Netherlands has changed during the period that the research took place and from the moment this thesis was completed. Major changes have occurred with respect to the job content of nurses in elder care in the Netherlands. In 2015 the Social Support Act (Dutch: WMO) and the Chronic Care Act (Dutch: WLZ) were introduced to replace the Exceptional Medical Expenses Act (Dutch: AWBZ). Less elderly have entered residential elderly care: 119,063 elderly in 2010 and 115,321 elderly people in 2017 (8), and more elderly people continue to live at home. For example, in the age group of 70 years or older, in 1997 1,413,049 elderly lived at home, in 2015 1,993,253 elderly lived at home and in 2018 2,239,579 elderly lived at home (9). Research by the Dutch Healthcare Authority (NZA) shows that 94% of all 65- years old and of all over 85-years old 70% still live at home (10). Because of this, only high-level care is provided to clients in nursing homes and all medium and low-level care at home. These changes have contributed to an increasing complexity and intensification of care in nursing homes. More and higher educated personnel is needed because patients in nursing homes have more complex problems. This is accompanied by an increase in work related load and a greater turnover and a shortage of nursing staff (11).

As a consequence, the relevance of the role of the work schedule and the fit between the work schedule and private life has gained importance. This is particularly the case for nursing staff working in residential nursing homes, but also, for example, for hospital staff.

Overall, the results of this thesis are relevant to many stakeholders such as nurses of residential elder care organizations, nurse managers, supervisors, Human Resource-professionals and occupational physicians. They can use the findings during their practice. Also, the findings can encourage these professionals to improve their work activities on an individual level. Hopefully, it contributes to keeping a sustainable nursing population and consequently to the quality of care for older people staying in residential elder care homes.

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APPENDIX 2 DE PROF VRAGENLIJST

PRoF-vragenlijst (**P**rive-**R**ooster-**F**it) om de ervaren fit van het rooster met het privéleven te monitoren. De score op elke vraag varieert van 1 (heel ontevreden) tot 5 (heel tevreden). De totaalscore wordt berekend door de score op elke vraag te sommeren. De totaalscore kan variëren van 14 tot en met 70. Een hoge score veronderstelt een hoge mate van fit van het rooster met het privéleven. Vervolgens kan in onderstaande tabel gekeken worden in welke mate men een fit ervaart tussen het rooster en het privéleven. Een score van 51 of hoger veronderstelt een goede fit van het rooster met het privéleven.

Tabel 1: Normscores voor de PRoF (n=453)

"Hoge fit"	55	≤	score	
"Gemiddelde fit"	45	≤	score	< 55
"Lage fit"			score	< 45
M	49.6		Med	51
SD	8.27		IQR	10
SE	0.39		Min	14
			Max	70
"Hoge fit"	75e percentiel	≤	score	
"Gemiddelde fit"	25e percentiel	≤	score	< 75e percentiel
"Lage fit"		≤	score	< 25e percentiel

PRoF -vragenlijst

Instructie De volgende vragen gaan over de (on)tevredenheid over uw onregelmatige werktijden in combinatie met andere aspecten van het dagelijks leven. Geef aan in welke mate u hierover tevreden bent. Doe dit door één van de vijf cijfers te omcirkelen. De cijfers hebben de volgende betekenis:

	1=	2=	3=	4=	5=
	Heel ontevreden	Ontevreden	Noch ontevreden /noch tevreden	Tevreden	Heel tevreden
1. Hoe tevreden bent u in het algemeen met uw onregelmatige werktijden?				1	2 3 4 5
2. Hoe tevreden bent u met de tijd die u door onregelmatige werktijden voor uw gezin, familie en/of kennissen kunt vrijmaken?				1	2 3 4 5
3. Hoe tevreden bent u met de tijd die u heeft voor hobby's (sporten, uitgaan, verenigingen e.d.)?				1	2 3 4 5
4. Hoe tevreden bent u met het benutten van de slaap vanwege onregelmatige werktijden?				1	2 3 4 5
5. Hoe tevreden bent u met het feit dat u vaak in het weekend moet werken door onregelmatige werktijden?				1	2 3 4 5
6. Hoe tevreden bent u met de mogelijkheid om door onregelmatige werktijden op doordeweekse dagen inkopen te kunnen doen (kleren, cadeaus e.d.)?				1	2 3 4 5
7. Hoe tevreden bent u met de mogelijkheid buiten werktijden zaken te kunnen regelen door onregelmatige werktijden (auto naar garage, schoonmaken, reparaties aan huis e.d.)?				1	2 3 4 5
8. Hoe tevreden bent u met het feit dat u door onregelmatige werktijden wel eens met feestdagen moet werken?				1	2 3 4 5
9. Hoe tevreden bent u met het volgen van een normaal eetpatroon vanwege onregelmatige werktijden?				1	2 3 4 5
10. Hoe tevreden bent u over de combinatie onregelmatig werk-vrije tijd?				1	2 3 4 5
11. Hoe tevreden bent u over de afwisseling in uw werk door onregelmatige werktijden?				1	2 3 4 5
12. Hoe tevreden bent u over het contact met familie, vrienden en kennissen vanwege de onregelmatige werktijden?				1	2 3 4 5
13. Hoe tevreden bent u in het algemeen over de dienstroostering van onregelmatige werktijden?				1	2 3 4 5
14. Hoe tevreden bent u over de extra inkomsten vanwege uw onregelmatige werktijden?				1	2 3 4 5
SOM					+

DANKWOORD

"Love to travel, but hate to arrive" (A. Einstein): een dankwoord.

Het proefschrift is klaar met het bereiken van het eindstation van deze reis. De route leidde langs lastige kruispunten waar (promotie)rooster, docentschap en privéleven met elkaar botsten. Tijdens deze reis wisselden stations van bevlogenheid, uitputting, en bezinning elkaar regelmatig af en was soms een lange 'stopover' nodig om ruimte te geven aan het docentschap en privéleven. Het was een leerzame tijd. Mijn dank gaat uit naar iedereen die zijn of haar bijdrage heeft geleverd aan het onderzoek of mij tijdens deze reis gesteund heeft. Ik zal er vast een aantal vergeten (die bedank ik tijdens het feest), maar de volgende personen zijn tijdens het proces erg belangrijk geweest.

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congress. Yvonne, bedankt voor je bijdrage aan hoofdstuk 3 en dat je tijdelijk de rol van Josephine overnam als co-promotor. Ik zie de excelsheets af en toe nog voor mij opdoemen waarin we die enorme hoeveelheid aan roosters wisten te reduceren. Bedankt voor je maandelijkse tips voor artikelen over shiftwork en de nauwkeurigheid tijdens het schrijfproces (tot op de spaties aan toe..). Nicolle, Bedankt dat je Angeliques taken waarnam tijdens haar zwangerschapsperiode. Het was zeer waardevol in het submitten en accepteren van het artikel uit hoofdstuk 2. Veel dank aan de leescommissie: Fred Zijlstra, Allard van der Beek, Beatrice van der Heijden en Jan Hamers voor het beoordelen van dit proefschrift.

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hen zie ik jullie drang om een omgeving te creëren waarin plezier en ontwikkeling mogelijk is. Dank je wel voor alles!

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"Nothing behind me, everything ahead of me, as is ever so on the road" (J. Kerouac)

Velen hebben interesse getoond in deze reis en dit onderzoek en zich afgevraagd of het het wel waard was, waarvoor ik het gedaan heb en wat ik ermee kan doen. Dat doe ik nog steeds, maar voor nu:

*"F*ck it Dude, let's go bowling" (W. Sobchak)*

VELIBOR

ABOUT THE AUTHOR

Velibor Peters was born on the 22nd of July 1971 in Bommel, the Netherlands. After completing his secondary education at the Scholengemeenschap Oost-Betuwe, he obtained a bachelor degree in physiotherapy at the HAN University of Applied Sciences (HAN: Hogeschool of Arnhem and Nijmegen). After working for several years as a physiotherapist in elderly care, he started a part-time master's degree in Health Sciences, with a specialisation in Health Promotion & Education at the Maastricht University. The subject of his master thesis was the perception of irregular working hours of nursing staff. After completing his master in 2004, he started to work for the Institute for Sports and Exercise studies (ISBS) at the HAN University of Applied Sciences and was involved in a research project on sport and exercise for employees with chronic respiratory disease. In 2008, he started his PhD trajectory at the Maastricht University, Department of Social Medicine, CAPHRI (Care and Public Health Research Institute). He also started as a lecturer at the ISBS and became a member of the Occupation & Health research group, at the HAN University of Applied Sciences. During his PhD trajectory, he followed various courses to further develop his scientific competences and carried out other research projects including a study on the relationship between a healthy lifestyle and school dropout among vocational education students. His research has led to scientific publications in international peer-reviewed journals and presentations at both national and international conferences. Since 2012, Velibor works as a lecturer and researcher in bachelor's and master's education at the HAN University of applied sciences. He has been working for the research team Health Promotion & Performance (HPP). Within this team he focuses on the knowledge transfer between practice, education and research and his research topics are well-being of bachelor students, shiftwork and sustainable employability. He works as a lecturer at the master 'Sport and Movement Innovation', a master program that focuses on social innovation within the field of sport, health and human movement.

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Projects

Testjeleefstijl(Test-your-lifestyle): Early signals of early school dropout?

In this project funded by a grant from ZonMw (Project number: 531001101), it was investigated whether the TJL-test has a predictive value for school drop-out and school performance of vocational educational students of the ROC-Nijmegen, and if the TJL test could ultimately serve as an instrument for early identification of students with an increased risk of early school dropout.