Morningness-Eveningness and Flextime Possibilities:
Connections Between Circadian Rhythm, Work Day Schedule, Well-Being and Productivity.

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Abstract

The current study aimed to investigate earlier reported connections to the morningness-eveningness dimension or flextime, and to offer an explanatory model linking these variables to well-being and productivity. Earlier findings gave the impression that it could be beneficial for both organizations and employees to have work schedules allowing employees to take their own circadian rhythm into account when planning their work day, since well-rested employees have been shown to be happier and more productive (Gaultney & CollinsMcNeil, 2009). Earlier studies on flextime have not, however, divided between morning- and evening-types when looking at effects – a gap the current study addressed. Employees ($N = 246$) working in Norwegian organizations participated in a survey, and answered a questionnaire especially designed for this study. Results showed that Evening-types and Morning-types differentiate on sleep-need and ideal work day start. Results also showed that respondents with- and respondents without flextime possibilities differentiated on experienced stress and deviation between ideal and real start of the work day. By analyzing three different models to explain links among people's sleep patterns, flextime options at work, their well-being and productivity with Structural Equation Modeling, results showed productivity (in particular quality of work) were through variables connected to both flextime and circadian rhythm.

Keywords: morningness-eveningness, circadian rhythm, flextime, job satisfaction, sleepiness, well-being, work day

Sammendrag

Målet med denne studien var å undersøke tidligere rapporterte forbindelser til A- og B-menneskedimensjonen eller fleksitid, og å tilby en forklaringsmodell for koblingen mellom disse variablene til trivsel og produktivitet. Tidligere funn ga inntrykk av at det kunne være fordelaktig for både organisasjoner og ansatte å ha arbeidstider som tillater de ansatte å ta sin egen døgnrytme i betraktning når de planlegger sin arbeidsdag, ettersom uthvilte ansatte har vist seg å være lykkeligere og mer produktive (Gaultney & CollinsMcNeil, 2009). Tidligere studier på fleksitid har imidlertid ikke delt mellom A- og B-mennesker når de har sett på effekter – et gap denne studien ønsket å ta for seg. Ansatte (N = 246) som arbeider i norske organisasjoner deltok i en undersøkelse, og besvarte et spørreskjema spesielt utviklet for denne studien. Resultatene viste at A- og B-mennesker differensierte på søvnbehov og ideell start på arbeidsdag. Resultatene viste også at respondentene med- og respondentene uten fleksitid differensierte på opplevd stress og avvik mellom ideell og reell start på arbeidsdagen. Ved å analysere tre komplekse modeller, for å forklare koblingen mellom folks søvnmønster, mulighet for fleksitid, velvære og produktivitet med Structural Equation Modeling, viste resultatene at produktivitet (særlig kvaliteten på arbeidet) var gjennom variabler knyttet til både fleksitid og døgnrytme.

Nøkkelord: A- og B-mennesker, døgnrytme, fleksitid, jobbtilfredshet, trøtthet, velvære, arbeidsdag.

Preface

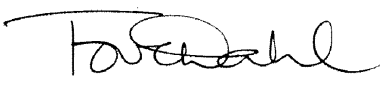
This study was conducted as part of a master's degree at The University of Tromsø. The idea to this project stems from a dialog between the author and the supervisor, Tove Irene Dahl, in November 2009. The supervisor presented an idea for exploring circadian rhythm among the elderly in the North of Norway, as counterpart to the supervisors earlier conducted study on circadian rhythm among children. The author found the circadian rhythm approach interesting, but also expressed her personal interest for organizational psychology. The author and the supervisor agreed that these interests were able to combine, and explore further through performing an empirical study by assessing circadian rhythm, flextime possibilities, and other aspects of the work day and leisure time.

First, the author carried out a literature review and a qualitative study exploring connections to both circadian rhythm and flextime possibilities. These explorations gave the foundation for the author, the supervisor and the co-supervisor, Lisa Sethre-Hofstad, for discussing and developing an idea and plan for the quantitative study and developing a suitable questionnaire. The questionnaire consisted of some earlier developed scales, but also of many items the author, the supervisor, and the co-supervisor argued could be of interest.

Then, the author collected data through distributing the online survey to two different organizations and on various online medias. The statistical analyses in SPSS were conducted by the author, under the guidance of the supervisor. Statistical analyses performed to test the hypothesized models with Mplus were performed by the author. Professor Joar Vittersø assisted with creating the modified model necessary for the hypothesized model that was not supported. Lastly, the author performed the writing of this thesis under the guidance of the supervisor.

The project has enriched the author by giving valuable insight in the methodology of science. In addition to the authors learning process, the study has contributed to shed new light on an important view of productivity and well-being in an organizational context.

Linda Catrine Stenvold
Student



Tove Irene Dahl
Supervisor

Introduction

"A good sleep policy is smart business strategy. People think they're saving time and being more productive by not sleeping, but in fact they are cutting their productivity drastically" *Charles A. Czeisler* (Fryer, 2006, "The corporate sleep policy of yours sounds a little draconian, if not possible, given people's crazy schedules", para. 1).

People are different in when they ideally wake up and go to sleep and when they feel best during the day. Some are extreme morning-types who prefer to both start and end their days before the majority of the population does so, and others are extreme evening-types who prefer to start and end their day after the majority of the population do. Meanwhile, employees often have set times of the day for when they expect their employees to be at work – times that fit people's natural sleep rhythms differently. Might flexibility in when we can start and end our work day matter to how we feel and perform at work? Much research has shown flexible work schedules having positive effects for the similar things that circadian rhythm and sleepiness affect.

The current study aimed to investigate earlier reported connections between the morningness-eveningness dimension and flexible work arrangements and further to provide an explanatory model that links this to well-being and productivity. Earlier findings have given the impression that it could be beneficial for both organizations and employees to have work schedules allowing employees to take own circadian rhythm into consideration when planning their work day, since well-rested employees have been shown to be happier and more productive (Gaultney & Collins-McNeil, 2009). However, earlier studies on flextime have not looked at whether this might affect morning- and evening-types differently - something the current study aimed to redress.

The Nature of Circadian Rhythms

Definition of circadian rhythm *n.*: A daily rhythmic activity cycle, based on 24-hour intervals, that is exhibited by many organisms (Circadian rhythm, n.d.).

People's circadian rhythm is affected by several biological factors (Dijk & Edgar, 1999; Zlomanczuk & Scwartz, 1999; Turek, 2000; Daan, Beersma & Borbely, 1984; Dijk & Czeisler, 1994; Borbely & Achermann, 1999; all referred to in Paine, Gander & Travier, 2006), and influences physiological and psychological processes in an individual throughout the day (Carrier & Monk, 2000). There are individual differences in this rhythm that affect people's preferences for when to get up in the morning, and when to go to bed at night, as well as peoples "feel-best" times of the day. These preferences are often measured by the Morningness-Eveningness Questionnaire (Horne & Östberg, 1976). This rhythm is consistent

with body temperature rising or falling (Baehr, Revelle, & Eastman, 2000; Kerkhof, 1985; Natale & Adan, 1999; Tankova, Adan & Buela-Casal, 1994). The highest temperature peaks of the day indicate when people are fit to perform at their optimum level (Natale & Lorenzetti, 1997, in Natale & Cicogna, 2002; Díaz-Morales & Sorroche, 2008). This rhythm also include preference for usual mealtimes, cortisol and melatonin secretion (Kerkhof, 1985; Natale & Adan, 1999; Tankova et al., 1994).

During our lifespan, people tend to shift toward eveningness in puberty, and toward morningness later in life (Vink, Vink, Groot, Kerkhof & Boomsma, 2001). Studies over the last years have shown somewhat contradicting results when it comes to gender differences, but a meta-analysis of 52 studies showed that women tend to be more morning-oriented than men (Randler, 2007). Genetic factors have been argued to explain between 44-47% of the variance in morningness-eveningness dimension (Vink et al., 2001). In addition to biological factors, external factors such as work schedules (Monk, 2005), social factors about when to go to bed and wake up, and light intensity (Czeisler, Buxton & Khalsa, 2005) have been shown to play a part in the circadian rhythm, as well.

Morning-type individuals have a tendency to have personality traits with higher scores on *Stability* (Agreeableness and Conscientiousness) (Digiman, 1997, in DeYoung, Hasher, Djikic, Criger & Peterson, 2007), lower scores on neurotisism (DeYoung et al., 2007) and lower scores on anxiety (Díaz-Morales & Sánchez-López, 2007) than evening-type individuals.

Lack of Sleep and Tiredness

While circadian rhythm concerns time of sleep preferences, it is important to elaborate on how sleep and lack of sleep affects us. There is much literature on the importance of getting enough sleep, and on the consequences of sleeping problems for several aspects of both personal- and work life.

Lack of sleep and daytime sleepiness matters since it is associated with decreased work productivity, including time management, interpersonal relationship, work output (Mulgrew, Ryan, Fleetham, Cheema, Fox, Koehoorn, …Ayas, 2007; Johnson, Breslau, Roth, Roers, & Rosenthal, 1999; Gaultney & Collins-McNeil, 2009), and the quality of problem solving (Gaultney & Collins-McNeil, 2009). Well-rested workers are likely to be happier, healthier, and more productive, than their less rested colleagues while sleepy employees are more likely to be late for work or absent, have accidents, experience lower quality of life, lower motivation and more irritability than their well-rested colleagues (Gaultney & Collins-McNeil, 2009).

Gaultney and Collins-McNeil (2009) reviewed National Sleep Foundation's (2005) findings showing that almost 30% of adults surveyed reported to have missed work or made errors at work because of sleep problems. Sleep deprivation has been shown to affect attentional processes in many ways; slowing responses, causing laps in attention and enhances the "time-on-task" effect (Lim & Dinges, 2008).

People can also get so accustomed to being sleepy they no longer recognize that they are sleepy, and therefore misperceive to which extent their abilities (such as judgment, problem solving, reaction times, etc.) are impaired by sleepiness (Rosekind, 2005). By routinely getting fewer than seven hours of sleep per night, people can display cognitive deficits similar to those seen in people with one to three nights of total loss of sleep (Banks & Dinges, 2007).

Hidalgo, De Souza, Zanette and Nunes (2003) found the morningness-eveningness dimension correlating with daytime sleepiness (ESS). Evening type individuals reported a greater daytime sleepiness compared to morning- and intermediate-type individuals, they also reported shorter total amount of sleep than the other two groups. This finding supported earlier findings by Clodoré, Benoit, Foret & Bouard (1990), but not by Taillard, Philip & Bioulag (1999). Hildago et al (2003) suggest that these differences in findings may reflect differences in the samples studied, as their own study was based on young adults.

Schedules affect circadian rhythm and sleep. During work, Valdez, Ramírez and García (2010) found that lack of sleep makes adjustments to work schedule harder for evening type individuals. On vacation, Evening-type individuals adjust their sleep schedules, tending to delay their sleep more during vacation than morning-type individuals (Valdez et al., 2010).

Stone, Scwhartz, Schwarz, Schkade, Krueger & Kahneman (2006) observed diurnal cycles and reported on 12 emotion adjectives in 909 women over a working day. They found bimodal patterns with peaks at noon and evening for positive emotions, peaks at mid-morning and mid-afternoon in negative emotions. They also found a V-shaped pattern for tired and an inverted U-shaped pattern for competence. This replicated findings from prior studies. Selvi, Gulec, Agargun and Besiroglu (2007) argued that "adjusting work schedule with the morningness and eveningness characteristics of the workers may improve their mood alterations" (p. 241), because individuals with different circadian characteristics react differently to sleep deprivation.

Issues Related to Sleep Problems and Work Performance

Dirkson and Epstein (2008) suggested that employees should be educated about the importance of sleep and sleep hygiene, and that this education should include basic

information about sleep processes and functions, developmental sleep changes, circadian rhythms, individual sleep needs, the impact of sleep deprivation, and effective sleep practices.

Extreme sleep problems. Being a "night-person", among other predictors, has been argued to have impact on insomnia occurring (Roth & Roehrs, 2003; in Gaultney & Collins-McNeil, 2009). Bolge, Doan, Kannan and Baran (2009) used DSM-IV-TR's definition of insomnia; "experiencing problems falling asleep, staying asleep, waking too early, and/or not feeling rested even after ample time in bed – associated with impairment in daytime, where these symptoms are not associated with another condition and affect daily life."

Workers with insomnia report lower work-related self-esteem, less satisfaction with their job, as well as less efficient functioning at work (Gaultney & Collins-McNeil, 2009). By using the work productivity and impairment questionnaire (WPAI) Bolge et al. (2009) found that insomnia was associated with poorer physical and mental quality of life, work productivity loss (10% greater than the non-insomnia group) and activity impairment (insomnia accounted for 18%).

Productivity. Zelenski, Murphy and Jenkins (2008) investigated "happy" as job satisfaction, quality of work life, life satisfaction, positive affect, and negative affect, and they noted that positive affect was strongest, but not exclusively, tied to high productivity. Zelenski et al. (2008) reviewed several studies, arguing that subjective measures of productivity are valid (Landy & Farr, 1983; Butler, Aasheim & Williams, 2007).

Kaplan, Bradley, Luchman & Haynes (2009) found that positive affect was positively related to task performance and OCBs (Organizational Citizenship Behaviors), and pointed out that findings about the happy-productive worker thesis vary by context (Judge, Thoresen, Bono & Patton, 2001; in Kaplan et al., 2009). Since positive affect is related to work performance, it is reason to assume that negative affect also play a part in understanding productivity. Verplanken, Friborg, Wang, Trafimow & Woolf (2007) developed a scale measuring to what extent negative thinking occurs often, unintentionally or unconsciously, and to what extent negative thoughts are hard to control. The scale is called Habit Index of Negative Thinking (HINT), and has been shown to correlate with low self-esteem.

DeVoe and Pfeffer (2009) Reviewed several studies with highly consistent findings regarding the connection between income and happiness. "The results show that income was more strongly associated with happiness for individuals paid by the hour compared to their non-hourly paid counterparts. Although there were highly consistent results across multiple studies employing multiple methods, overall the effect size was not large." (DeVoe & Pfeffer, 2009, p. 1602).

Coping with Sleepiness at Work

When people have problems with sleeping or awakening they often use artificial stimuli to cope with it, like sleeping pills (for sleep) or caffeine (for awakening). High intake of caffeine is associated with feeling tired in the morning, and having difficulty sleeping (Orbeta, Overpeck, Ramcharran, Kogan, & Ledsky, 2006). The authors suggested that frequent caffeine consumption can interrupt the normal sleep cycle, causing tiredness in the morning. This study did not differentiate between morningness-eveningness preferences, however, and may have missed some interesting individual differences.

Are there other ways, beside e.g. caffeine, to cope with sleepiness at work? The body has its own hours of the day when it is natural to perform best. To have to perform at odds or outside of these hours may not be ideal. One way to let people respond to their bodies' own rhythms is to provide structural flexibility, allowing people to have flexible starting and ending times at work. A work schedule like this is often called flextime, or a flexible work schedule.

Flextime

Flextime arrangement provide employees to adjust starting and stopping times for their work day within some limitations, while requiring a standard number of hours to be worked within a given time period. Within the flextime arrangement there are variations, some includes that employees can bank extra time worked so that later days can be shortened. (Christensen, 1990).

A flextime program usually consists of five interrelated components (Christensen, 1990)

1. Core hours during which all employees are required to be working (e.g. 10:00 am to 12:00 pm and 2:00 to 4:00 pm).
2. A band of flexi-hours (band width) within which all work hours must be worked (e.g. 6.00 am to 6.30 pm).
3. Amount of variation in the length of the lunch hour.
4. Flexibility in changing starting and stopping times. Some firms allow change daily (a sliding schedule); others weekly or monthly, or less frequently with prior notice (flexitour).
5. In some cases employees are allowed to bank time so that the length of the workday can be varied and can be banked for future time off.

(p. 459).

Findings regarding the effects of flextime have varied. In 1990, Christensen reported that flextime is used more and more to solve work/family conflicts, but that researchers have not found equally compelling support for other positive effects of using flextime as hoped for. Some have not found any differential effect, others have found positive effects. However as far as the literature shows, there have been no negative effects of this arrangement documented.

Employees who viewed their work schedule as flexible have reported higher levels of work-life balance, which in turn was associated with positive paths to well-being (i.e. reduced stress, minor health issues, sleeping disorders, increased control, and feeling) (Jang, 2010). Jang (2010) reviewed studies that have found flexible work hours positively associated with some aspects of family life (Ezra & Deckman, 1996), decreases in absenteeism and turnover (Dalton & Mesch, 1990; Galinsky & Johnson, 1998), and increases in job satisfaction (Hill, Hawkinsm, Ferris & Weitzman, 2001; Saltzstein, Ting & Saltzstein, 2001; Scandura & Lankau, 1997). The work-life balance findings are in tune with findings that flextime is correlated with reduction in inter-role conflicts (Hicks & Klimoski, 1981; Krausz & Hermann, 1991). Both flextime and sleepiness were associated with inter-role conflicts in some way, and this gives reason to believe that flextime could decrease experience of sleepiness on the job. Employees working under a flextime schedule also report improvements in travel and parking, a greater feeling of being in control of the work setting, and feel more opportunity for engaging in leisure activities (Hicks & Klimoski, 1981). Hicks & Klimoski (1981) did not find support for flextime having an impact on work satisfaction or leisure satisfaction. On the other hand, Baltes, Briggs, Huff, Wright and Neuman (1999, in Ng, Butts, Vandenberg, DeJoy & Wilson, 2006) did find that alternative work schedules had positive effects on job satisfaction.

Greenhaus and Beutell (1985) suggested that flexible work arrangements have positive effects on time-based inter-role conflicts between work and family, and pointed out that this problem has been found to be a source of discomfort, strain and burnout. Work schedule flexibility (measured by a 5-item scale) (Morrow, McElroy & Elliot, 1994, as referred to in Ng et al., 2006) is positively related to organizational commitment in both part-time and full-time workers (Ng et al., 2006).

Purpose of the Study

Given what we know so far about circadian rhythm, flextime, sleepiness, feelings, job satisfaction and productivity, it would be interesting to investigate if earlier covariance between these measures could be found within a larger chain of variables. To be able to

adjust work schedules and tasks to accommodate circadian rhythms can be beneficial for both organizations and employees since well-rested employees have been shown to be happier, experience more satisfying work-life balance, have less inter-role conflicts, and being more productive.

Earlier studies on flextime have not divided morning- and evening-types when looking at effects, however. This study therefore aimed to explicitly explore effects linked up to circadian rhythm-types, comparing morning- and evening-types, with or without flextime opportunities, hypothesizing that evening-oriented people would show larger differences on variables linked to the work day (job satisfaction, well-being, productivity, and structure) based on whether or not they worked with the option of flextime possibilities. For group comparisons, this study would have four groups of respondents;

- Morning-types with flextime possibilities
- Morning-types without flextime possibilities
- Evening-types with flextime possibilities
- Evening-types without flextime possibilities

This study explored, with self-report measures, how working adults' morningness-eveningness preferences and their work schedule choices were related to variables like daytime sleepiness, productivity, job satisfaction, negative thoughts and emotions. As an additional predictor for these measures, the Habit Index of Negative Thinking (HINT) (Verplanken et al., 2007) was included. HINT has been shown to correlate with low self-esteem. The author suggested that low self-esteem can affect how respondents rate their answers on well-being and productivity variables. Therefore exploring HINT in this context seemed interesting, as it may control for possible connections that may represent a source of error in the data.

The focus was primarily on subjective experiences of the structure and quality of the work day by people who differ on the option of flextime and the ability to arrange and manage their work tasks throughout the day. Most of the research done on work and sleep issues focus on shift work. The present study focuses rather on employees in Norway working in "standard" 8 to 4 jobs, who are working around a core time, with or without traditional flexibility in their work schedule. This means that people with absolute freedom, but with particular deadlines or quotas they have to meet, was not included in this study.

A short qualitative study with six independent interviews was done. The interview guide was mainly based on earlier research, but formed as quite open for the respondents to talk about their own experiences. Results from the interviews were both supporting for earlier

research, but revealed some new aspects. These interviews supplied guidelines for selecting relevant variables from earlier studies, as well as providing input for generating hypotheses.

The details of the results from the interviews are not represented in this thesis, though, in sum, there were distinct trends in how differently evening-type respondents answered questions about their work day based on whether or not they had flextime possibilities, underscoring that flextime was a much more important aspect of their job, compared to the morning-type respondents.

One of the most interesting aspects the interviews revealed was the notion about flextime being a "meaning-making" program. – Something that makes employees *wanting* to maintain high quality of their work, because of increased feelings of responsibility- and freedom. Also it was pointed out that when employees were given the possibility to balance work demands and private arenas, they're given space for maintaining own interest. This in turn, strengthens the motivation and the feeling of wanting to "give something back" to the organization they are working for. The author noted this as a possible explaining model, but did not calculate these aspects into the hypotheses.

Hypotheses

Based on earlier research's findings, figure 2 was drawn to show connections among variables currently dominating the literature. All arrows represent earlier findings, except from the two arrows linked to the new HINT variable. Testing the model enables us to determine the degree of support for all these connections. These are described by hypothesis 10. This study use a deviation measure between ideal start of work day and real start of work day to represent "work-life balance" in the model. In comparative analysis other measures like hours of work done in leisure time and deviation measure between ideal end of work day and real end of work day, are also used to represent the work-life balance aspect. The main hypothesis for this study was shown visually in figure 1, it was a less complicated model, compared to figure 2, and aimed to show clear indirect connections from flextime to productivity. The author wanted to test this model separately for the two extremes in the morningness-eveningness dimension. (Bold boxes in the model indicating independent variables).

Main Hypothesis$_{(1)}$: Organizations with Flexible work arrangements for employees will have more rested employees who experience better work-life balance, which in turn leads to employees with high scores on well-being and Job satisfaction, and therefore productive workers as the happy-productive worker thesis claim. This will be especially relevant for

evening-oriented people who are the ones in biggest need for flextime opportunities. See figure 1.

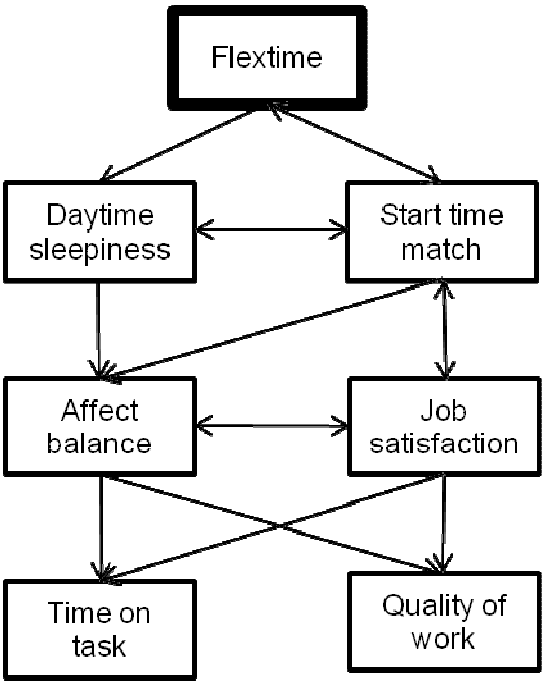


Figure 1. Main Hypothesis (1). This model would be tested for M- and E-type individuals in two separate analyses.

$Hypothesis_2$: There are differences between evening- and morning-types regarding sleep patterns.

$Hypothesis_3$: Evening-types report more Daytime sleepiness, more Negative emotions and less Positive emotions than morning-type coworkers.

$Hypothesis_4$: There is a connection between people's work schedules (Flextime) and their Circadian rhythm classification.

$Hypothesis_5$: When flextime is available, evening-types report they take more advantage of the possibility to adjust their workdays than do morning-types.

$Hypothesis_6$: Evening-types with no flextime possibility report lower job satisfaction, more daytime sleepiness, and higher levels of HINT than morning-type coworkers.

$Hypothesis_7$: Evening-types with no flextime are less productive and more tired than the other groups.

$Hypothesis_8$: Both morning- and evening-types structure their work tasks in order to match their feeling-best times, independent of flextime.

$Hypothesis_9$: HINT is significantly related to how people respond on questions regarding well-being and evaluation of their own work.

$Hypothesis_{10}$: Connections described in the literature review can be found within a larger model, along with HINT. See figure 2.

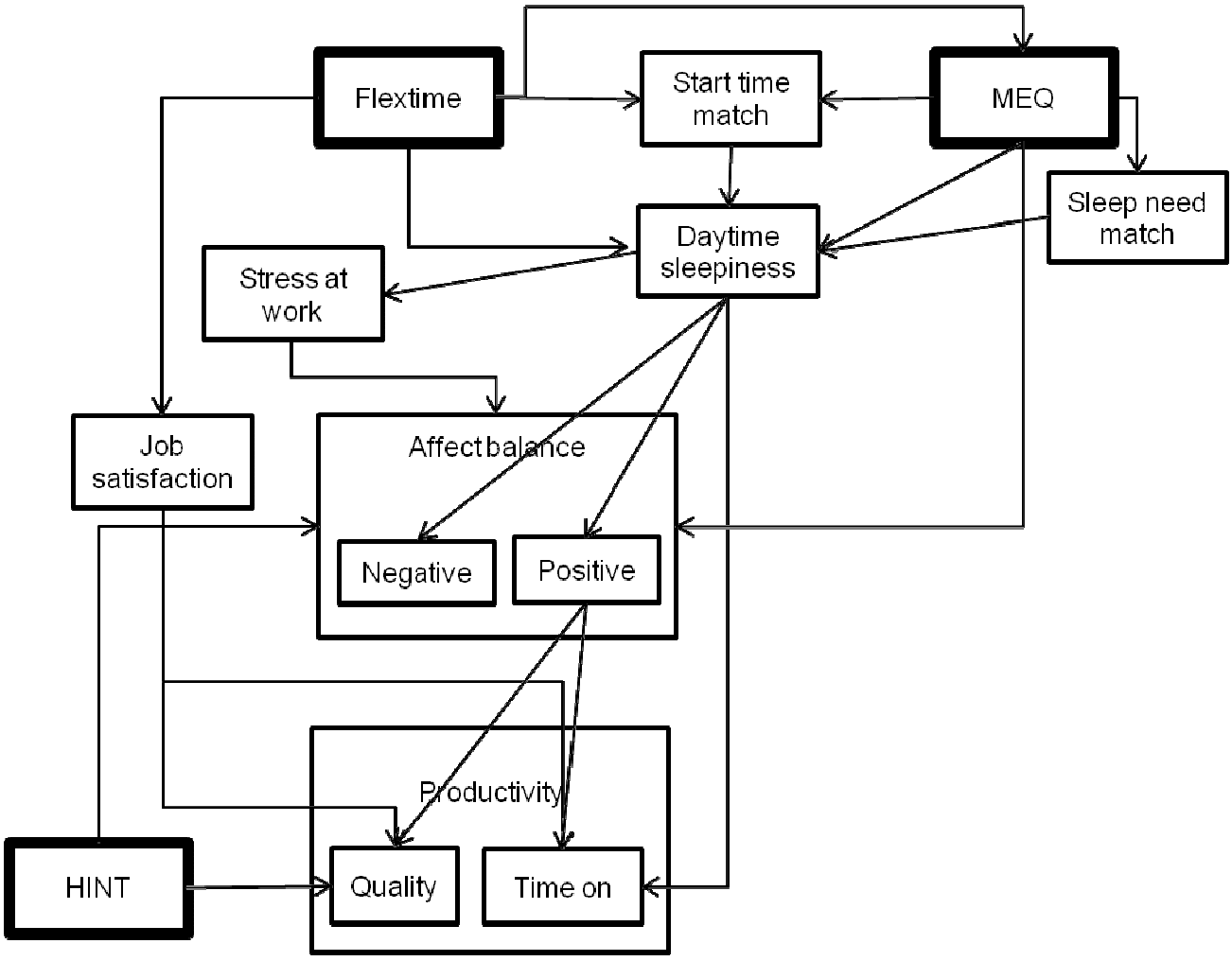


Figure 2. Hypothesis 10.

Method

Subjects

The sample consist of employees in Norwegian organizations (N = 246, 76% female). Age ranged from 23 to 73 years (M = 46.31, SD = 11.00). In this sample 216 respondents had flextime, and only 30 respondents did not have flextime. Eighty five percent of the respondents with flextime were able to change their starting and stopping times daily (sliding schedule), 14% were able to change weekly, and 2% were able to change monthly. All respondents with flextime had core time, the most frequent scores was 9:00 am (M = 8:54 am, SD = 40 min) to 3:00 pm (M = 2:57 pm, SD = 47 min). Almost everyone in the sample (97%) had non-hourly salary; therefore analyses to explore this variable in connection to other aspects, such as Affect Balance Scale and job satisfaction were not computed. Fifty nine percent of the respondents had 5 years or more University education, 26% had 3 years university/academy education, and 15% had less than 3 years higher education.

Materials

Questionnaire. Based on earlier findings and the qualitative study, a questionnaire was formed.

The questionnaire consisted of 45 main questions. Counting sub-questions for earlier validated scales and similar formed items (e.g. rated with the same likert-scale), there were a total of 87 questions (some of these were optional). The time to fill out a questionnaire was estimated to be 10-15 minutes. The items in the questionnaire exceeded the variables for the hypotheses, giving foundation for controlling for or revealing other interesting variables. The questionnaire is included in the appendix.

Demographic. The demographic questions in the questionnaire concerned sex, age, profession (open ended response), marital status, highest completed education, number and age of children.

Sleep patterns. To measure whether respondents were morning- or evening-types, a reduced version (5 items) of the 19-item MEQ was used (Adan, A., & Almirall, H., 1991). The reduced version consisted of question number 1, 7, 10, 18 and 19 from the original scale. Adan and Almirall (1991) assumed the reduced MEQ to have a high level of internal consistency (based on inter-item correlation and item-total score correlation), and reported it highly correlated with the original MEQ (r = .90, p < .00001). This scale was translated to Norwegian by Udnes, Johansen, Lilleholt and Pallesen.

To measure respondents actual sleep patterns the questionnaire contained questions about use of sleep (hours of sleep the night before a workday, and amount and length of sleep

in the afternoon (Length of nap in afternoon was coded from the answering alternatives to minutes, mean per alternative)).

Respondents were also asked how much sleep they felt they needed to be rested, and whether or not they felt their sleep patterns were natural for their body's rhythm.

Daytime sleepiness was measured with a Likert scale, ranging from not sleepy at all, to very sleepy, with one possible answer per question. There were 6 questions, each concerning different time aspect of the day (from 7:00 am to after 5:00 pm). In this study this was the measurement of how sleepy employees were.

Work frame. All respondents were asked what they would imagine the perfect 8-hour workday to be like, regarding starting- and ending time. They were then asked how their real workdays were, regarding the same aspects. Calculating deviation scores for these two timeframes displays the similarity or the difference between ideal and real workday. An open-ended response question was used to measure how much time respondents used on working in their leisure time (mean hours per week, this was coded to minutes and hours prior to analyzing). In this study these measures were used to represent work-life balance (a deviation score close to zero for the work day start and end, and number of hours working in leisure time indicating better balance).

Respondents were given "Yes" or "No" alternatives to whether they had flextime or not. The respondents that answered "No" were redirected on the questionnaire to questions that were relevant for both flextime and non-flextime employees, skipping over several questions regarding the use of flextime.

The respondents that answered that they did have flextime possibilities in their job were to answer questions regarding the frame of this flextime (earliest possible start, latest possible end, when it was a core time, how often they could change their work time, possibility to bank hours, and possibility to work from their home). In addition to this, respondents were asked (with a Likert scale ranging from 0 to 5; 0 being very little, and 5 being very much) to what extent they took advantage of flextime possibilities to make the workday fit their own needs, and to what extent they could imagine having a work without flextime possibilities.

The respondents with flextime possibilities were also asked what other factors influence their use of flextime. The 6 factors that the author could argue may have had an influence were listed, and were to be answered along a Likert scale ranging from 0 to 5 (0 being very little influence, 5 being very much influence). These 6 factors were; Transportation/Traffic jam, Meeting or other happenings at the workplace, Delivering/picking

up at daycare/school, Partners work hours, Leisure time activities, Family situation (respondents were asked to specify this in a open ended rubric). A 7th option called "other" was added with the same likert scale, also with the possibility to specify with an open ended response.

Three more questions were to be answered with the same Likert scale; these questions regarded how much flextime possibilities mean to the respondent when selecting a job, the respondent's wish for flextime, and the respondent's need for flextime.

All respondents were to answer about whether they were paid wages by the hour, paid a non-hourly salary, or paid by commission.

All respondents were asked if they had had the opposite (flextime or not) earlier, and if so, what they thought was the biggest difference for themselves in having flextime or not. This was an open ended response.

Control over the work day. Likert scales (ranging 0 to 5) were used to measure respondents' possibilities to structure their own workday (0 being no possibility, 5 being very much possibility), their degree of taking advantage of this possibility (0 being not planning at all, 5 being planning very much), and to what extent they structure their workday to fit their own "feel-best time" (0 being not planning according to own feel-best time at all, 5 being planning the entire work day according to own feel-best time).

Feelings. A likert scale ranging from 0 to 5 were used to measure how much stress respondents experienced in their work (0 being no stress, 5 being very much stress). Respondents were asked how satisfied they were with their job (answering possibilities on a scale ranging from -3 (very dissatisfied) to +3 (very satisfied)).

A modified version of Bradburn's (1969) Affect Balance Scale was applied to measure overall psychological well-being when at work. The scale was modified to focus on well-being at work by adding "…at work..." in the main stem of the question (Original main stem of the question: "During the past few weeks, did you ever feel…". Modified main stem of the question: "During the past few weeks at work, did you ever feel…". This scale consists of five positive statements and five negative statements that are to be responded by "Yes" or "No". Three scores were generated from this scale; positive affect, negative affect, and affect balance. Bradburn (1969) reported a Cronbach's alpha of .76 for the full scale. The translation of this scale into Norwegian followed established guidelines including appropriate back translations (Sortorius & Kuyken, 1994).

Habit Index of Negative Thinking (HINT) (Verplanken et al., 2007) consisting of 12 items was used to measure to what extent negative thinking occurs often, unintentionally or unconsciously, and to what extent negative thoughts are hard to control. Verplanken et al. (2007) reported high internal reliability ($\alpha = .94$) for this scale.

Productivity. For measuring productivity, two questions were applied; first, one question regarding the quality of respondents work. Second, another question regarding the time used to finish a task. Both of these variables were measured by asking respondents what kind of words described the quality of their work, and the time spent on a task. The questions had five answering alternatives, ranging from "Need much improvement" to "Exceeds standards largely" for the Quality measure, and from "Need much more time than prescribed" to "Have much time left when work is done" for the Time to finish a task measure.

Other. Respondents with partner were asked if their partner had flextime or not.

Respondents were also asked if they had ever taken a "sick day" because they were too sleepy/tired to go to work, and whether or not they would be more likely to have come to work this day if the work hours had been more flexible.

In the end of the questionnaire there was an open ended response for other comments.

Variable Preparation

Prior to the analysis, the following sum- and deviation scores were computed.

Sum scores. The Affect Balance Scale results were summed into three scores, according to the developer's description. Sum of positive affect was used for the "Positive affect" score, sum of negative affect was used for the "Negative affect" score. Positive affect minus negative affect plus a constant of five was used as for the "Affect balance" score.

HINT: The HINT score is a mean score of all the items (12).

rMEQ: First the answers on this scale had to be scored according to Horne and Östbergs (1977) descriptions. For the reduced MEQ this meant that answers on questions had to be scored like this;

- Question 1: 5 – 4 – 3 – 2 – 1
- Question 2: 1 – 2 – 3 – 4
- Question 3: 5 – 4 – 3 – 2 – 1
- Question 4: 1 – 5 – 4 – 3 – 2 – 1
- Question 5: 6 – 4 – 2 – 0

Then the sums of the scores were added up (ranging from 4 to 25). The higher score, the more morning-type. To split the sum score continuum up in types, these were the guidelines:

- Definitely morning type: 22-25

- Moderately morning type: 18-21
- Neither type: 12-17
- Moderately evening type: 8-11
- Definitely evening type: 4-7

A new variable was computed before comparative analyses were run. This variable was coded: extreme evening types as 1, and extreme- and moderate morning types as 5 (see results for why grouping was done this way).

To be able to measure connections between daytime sleepiness and other variables, a sum scores was made out of the sleepiness questions, based on principal component analysis.

Sleepy 7am-11am: sum of sleepiness questions in the time frame 7 am to 9 am, and 9 am to 11 am, divided by numbers of items (2).

Sleepy 11 am-5pm: sum of sleepiness questions in the time frame 11 am to 1 pm, 1 pm to 3 pm, and 3 pm to 5 pm, divided by numbers of items (3).

***Deviation scores*.** These new variables were computed to get an accurate number for each respondent about the differences between own perception of need compared to their actual life.

Sleep need match: How many hours of sleep needed to be rested minus how many hours of sleep respondents got the night before a work day. A positive number indicated that respondents got fewer hours of sleep than they needed.

Start time match: Real start of work day minus ideal start of work day. A positive number indicated that the work day started later than what respondents considered being ideal.

Start flextime match: Earliest start possible within the band of flexi-hours minus ideal start of work day. A positive number indicated that the earliest start possible was later than ideal start of work day.

Start core time match: Core time start minus ideal start of work day. A positive number indicated that core time started later than ideal start of work day.

End time match: Real end of work day minus ideal end of work day. A positive number represented that the work day ended later than what respondents considered being ideal.

End flextime match: Latest end possible within the band of flexi-hours minus ideal end of work day. A positive number indicated that the latest end possible was later than ideal end of work day.

End core time match: Core time end minus ideal end of work day. A positive number indicated that core time ended later than ideal end of work day.

Procedure

20 randomly selected organizations in Norway were invited to participate in the survey and two signed on. Respondents for the questionnaire was collected from one large organization in Tromsoe (Tromsoe Kommune), one large (anonymous) organization in Norway, via a link on the homepage for the University of Tromsoe, and via a link on The Norwegian Confederation of Trade Unions' (LO) facebook page.

Data were collected with an electronic questionnaire via SurveyMonkey during April, May, and June 2011. 267 respondents started the questionnaire, whereas 215 (81%) completed all the mandatory questions.

Respondents that finished the questionnaire had the opportunity to take part in a drawing for a price (one 1st price NOK 1000,-, two 2nd prices NOK 500,-) as thanks for their participation. 144 respondents participated, and the winners were randomly selected by a formula in Excel (Microsoft Office Excel 2007).

Software. Descriptive Statistics, Pearson's Correlation, Independent samples *t*-tests, Principal Component Analyses (PCA) and One-way Analyses of variance (ANOVA) were performed with IBM SPSS Statistics 19. SEM (Structural Equation Modeling) Path Analyses were performed with Mplus version 6.11.

Results

One of the purposes of this study was to examine and compare four groups. As a result of random sampling and difficulties in recruiting respondents for the non-flextime sample there would only be N=6 in each of the groups without flextime (see table 5 in the results). Because of this, analyses done with these four groups were not executed. Comparative analyses were first done using morning-type (henceforth M-type) and evening-type (henceforth E-type) classifications as grouping variables. Then comparative analyses were done by using "With flextime" (henceforth wFT) or "Without flextime" (woFT) as the grouping variables. It was possible to compare morning- and evening-types within the wFT group, analysis to test the hypothesis only depending on this grouping was therefore performed.

Results from Natale and Cicogna (2002) indicated that the morningness-eveningness dimension can be used as a continuum between two extremes. For the model testing analyses looking at both circadian rhythm and flextime dimensions, rMEQ will therefore be used as a continuum for getting a sufficient N.

For the flextime dimension, *t*-tests were first run on group comparison for each variable to determine if equal variances could be assumed for the two groups that were so different in size. Equal variances could be assumed, so the two groups, of different size, were compared in the subsequent analyses.

Scale Validation

Principal component analysis was used for scale items to check that the questions reflected the terms and variables as assumed, and to test construct validity. Construct validity has two subcategories, convergent and discriminant validity. Convergent validity means that questions about one variable are more alike to each other than they are to questions for other variables. Discriminant validity means that the answers for questions for different variables are sufficiently independent of each other (Trochim, 2006). In other words, the scales represent measures for different phenomena.

Items for the Affect Balance Scale were not included in the Principal Component Analysis because these items were dichotomous, and could therefore lead to artificial results (Kubinger, 2001). Reliability for the Affect balance Scale was Cronbach's Alpha (α) = .58. Reported inter-item correlation varied between .03 and .31 for the Positive Affect Scale, and between -.09 and .38 for the Negative Affect Scale. Overall correlation between Negative and Positive Scale items were less than .08.

Oblique rotation procedure was applied to make the factors in the Principal Component Analysis more meaningful and interpretable. The essential characteristic for this rotation method is that the factors are not required to be uncorrelated of each other (Howitt & Cramer, 2008). In social science it is generally expected some correlation among factors (Costello & Osborne, 2005).

Table 1 show the pattern matrix for items representing Habit Index of Negative Thinking (HINT), Reduced version of Morning-eveningness questionnaire (rMEQ), and daytime sleepiness from 9 am to 17 pm.

The discriminant and convergent validity was very high for HINT, whereas it was weaker for the rMEQ and daytime sleepiness. Based on cutoff rules for this sort of analysis the item "sleepiness 9-11 am" was removed. After this change was made, all three scales showed good discriminant and convergent validity. Table 2 shows the pattern matrix for the new Principal component analysis.

The only item that did not fill the criteria for this analysis was rMEQ 3. This item measured when respondents were tired in the evening and therefore needed to sleep. Based on the low factor loading, it could be argued to remove the item from the scale, but because of theoretical background and for comparison value, the author decided to keep the item in the scale for further analyses.

Table 1

Initial pattern matrix for scale items

	Component		
	HINT	rMEQ	Sleepiness
Hint 9	**.947**	-.019	-.024
Hint 5	**.931**	-.002	-.018
Hint 11	**.925**	.013	-.009
Hint 8	**.921**	-.004	-.010
Hint 2	**.917**	-.018	.030
Hint 3	**.916**	-.030	-.076
Hint 12	**.911**	-.003	-.016
Hint 7	**.902**	.036	.018
Hint 1	**.885**	-.034	.019
Hint 6	**.873**	.032	.044
Hint 4	**.850**	.033	.070
Hint 10	**.847**	.006	-.057
rMEQ5	.098	**.821**	-.003
rMEQ1	.008	**.782**	.054
rMEQ4	-.072	**.670**	.138
sleepy 9 to 11 am	.010	-.570	**.532**
rMEQ2	-.112	**.538**	-.249
rMEQ3	.058	**.362**	.190
sleepy 11 am to 1 pm	.047	-.080	**.798**
sleepy 1 to 3 pm	.025	.087	**.794**
sleepy 3 to 5 pm	.011	.158	**.709**
A	.98	.65	.71
Nr of items	12	5	4

Note. Extraction Method: Principal Component Analysis.

Rotation Method: Oblimin with Kaiser Normalization.

a. Rotation converged in 4 iterations.

Table 2

Final pattern matrix for scale items

	Component		
	HINT	rMEQ	D.Sleepiness
HINT 9	**.946**	-.022	-.019
HINT 5	**.930**	-.002	-.016
HINT 11	**.929**	.023	-.019
HINT 8	**.921**	-.002	-.012
HINT 2	**.919**	-.013	.024
HINT 3	**.915**	-.032	-.068
HINT 12	**.909**	-.005	-.011
HINT 7	**.903**	.039	.014
HINT 1	**.885**	-.035	.022
HINT 6	**.868**	.020	.055
HINT 4	**.853**	.042	.057
HINT 10	**.847**	.006	-.052
rMEQ 5	.096	**.820**	-.021
rMEQ 1	.017	**.805**	.004
rMEQ 4	-.063	**.692**	.087
rMEQ 2	-.095	**.577**	-.300
rMEQ 3	.047	**.341**	.200
sleepy 1 to 3 pm	-.007	.011	**.845**
sleepy 11 am to 1 pm	.047	-.086	**.766**
sleepy 3 to 5 pm	-.017	.093	**.752**
A	.98	.65	.72
N of items	12	5	3

Note. Extraction Method: Principal Component Analysis.

Rotation Method: Oblimin with Kaiser Normalization.

a. Rotation converged in 4 iterations.

To get a sense of how people scored and how the variables intercorrelated, the correlation matrix (Table 3) was made using variables that were used in the hypothesized models, along with End time match, Work in leisure time, Use of flextime, and Numbers and Length of naps in the afternoon. As shown in the table, the strongest correlations were found

between HINT and Affect balance (negative, indicating that the higher scores on Habit Index of Negative Thinking, the lower Affect balance respondents experienced), rMEQ and Sleepiness from 7 to 11 am (negative, suggesting that morning-types tend to be less sleepy and evening-types more sleepy in that time slot), rMEQ and Start time match (positive, indicating that morning-types having a better match between start time and ideal start time than evening-types), Affect balance and Job satisfaction (positive, indicating that respondents with better Affect balance reported higher levels of job satisfaction), Positive affect and Job satisfaction (positive, indicating that employees experiencing more positive affect reported higher levels of job satisfaction) Negative affect and Job satisfaction (negative, indicating that employees experiencing more negative affect reported lower levels of job satisfaction), and Start time match and Sleepiness from 7 am to 11 am (negative, indicating that employees starting at a ideal time were less sleepy in that time slot).

Table 3

Correlation matrix for central items

		1.	2.	3.	4.	4.1	4.2	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.
1.	rMEQ																			
2.	HINT	.03																		
3.	Flextime	.04	.08																	
4.	Affect balance	-.00	-.43***	-.12																
4.1	Positive affect	-.10	-.31***	-.11**	.74***															
4.2	Negative affect	-.08	.36***	.02	-.83**	-.23**														
5.	Sleepy 7 am - 11 am	-.61***	.15*	.08	-.12	.07	.23**													
6.	Sleepy 11 am - 5 pm	-.07	.32***	.09	-.27***	-.16*	.26***	.15*												
7.	Sleep need match	-.28***	.17*	-.12	-.18**	-.07	.21**	.35***	.29***											
8.	Start time match	.44***	.05	.16*	-.08	-.19**	-.04	-.41***	-.03	-.30***										
9.	End time match	.31***	-.08	.07	-.04	-.18*	-.09	-.30***	-.15*	-.17**	.53***									
10.	Stress at work	-.13	.10	-.20**	.00	.06	.05	.16**	.11	.11	-.08	.07								
11.	Job satisfaction	.10	.29***	-.08	.61***	.50***	-.47***	-.13	-.16*	-.14*	-.06	-.01	-.11							
12.	Time on task	-.06	-.08	.14*	-.06	-.05	.05	.01	-.03	-.08	.03	-.05	-.31***	.01						
13.	Quality of work	.05	-.21**	-.08	.31***	.23**	-.25***	-.15*	-.12	-.11	.09	.07	.10	.14*	.07					
14.	Work in leisue time	.03	-.05	-.17**	.15*	.15*	-.09	-.05	-.08	-.02	-.01	.25***	.15*	.06	-.27***	.11				
15.	Take advantage of flextime	-.10	.04	.a	.05	.13	.03	.02	.02	.05	.15*	.04	.15*	-.07	.13	.05	.02			
16.	Length of nap in afternoon	-.14*	.01	-.20**	.04	.08	.01	.18**	.15*	.19**	-.16*	-.13*	.16*	.04	-.02	.08	-.03	.04		
17.	Nr. of naps per week	-.11	.02	-.06	.01	.00	-.01	.06	.20**	.18**	-.13*	-.12	.05	-.02	.06	.01	-.07	-.00	.53***	
M		13.49	2.70	.88	7.00	3.34	1.34	1.43	1.38	1.12	-.50	.10	2.78	1.59	1.79	2.07	3.72	2.99	.34	1.50
SD		4.05	1.72	.328	1.78	1.03	1.23	1.12	.97	.91	.84	1.05	1.09	1.29	.936	.95	5.54	1.51	.46	1.73
Scale		4-25	1-7	0-1	0-10	0-5	0-5	0-5	0-5	Dev.	Dev.	Dev.	0-5	-3 - +3	0-5	0-5	Hours	0-5	Hours	0-7

Note. * $p<.05$, ** $p<.01$, *** $p<.001$, .a = Cannot be computed because at least one of the variables is constant. Dev. = Deviation score

Morningness-Eveningness Dimension

MEQ score frequencies were examined to determine how to define the extreme morning- and evening-types in subsequent analyses. Ideally, the definitely evening- and morning types were to be compared, but because of the low frequency of "Definitely morning-type" respondents (N=3, *Table 4*), both "Definitely morning-type"- and "Moderately morning-type" respondents were used to represent the Morning-type respondents in the sample (N=42, *Table 4*). For the Eveningness aspect only respondents with the "Definitely evening-type"-scores were used (N=19) in analyses comparing these two groups. This decision had implications for the comparisons that were later done comparing morning-and evening-types in in the Flextime and Non-Flextime groups (see Table 5 below for an illustration). Ultimately, it is preferable to compare the extreme types with extreme types and moderately extreme types with moderately extreme types. However, the groupings were uneven in size and there was no ideal solution for how to group them evenly in a meaningful way. Given the near absence of the definitely morning types and to avoid group size difference extremes, this alternate way of grouping participants was chosen as the next-best option (definitely and moderately morning-types in the M-type category, and definitely evening types in the E-type category). Also, 12 one-way analyses of variance (six for comparing E-types and M-types, and six for comparing those with flextime and those without flextime) rather than a 2X2 analysis of variance were run. An Independent samples *t*-test was conducted for comparing E-types wFT and M-types wFT, for specifically testing the hypothesis demanding these grouping criterias. Removing woFT respondents from the comparison, cost valuable respondents, so the grouping was not explored further.

Table 4

Frequencies –rMorningness-Eveningness Questionnaire

Type	Frequency	Valid Percent
Total	263	100
Definitely evening-type	20	7.8
Moderately evening-type	66	25.9
Neither-type	126	49.4
Moderately morning-type	40	15.7
Definitely morning-type	3	1.2

Table 5

Group sizes – Morningness-Eveningness

N=22	D M-type	D E-type
Flextime	2	13
Without Flextime	1	6

N=61	**D&M M-type**	**D E-type**
Flextime	**36**	**13**
Without Flextime	**6**	**6**

N=122	D&M M-type	D&M E-type
Flextime	36	68
Without Flextime	6	12

Note. D = Definitely, D&M = Definitely and moderately. Morning- and evening-type in bold were used in comparative analysis

Six one-way analyses of variance were first run to compare M-type and E-type group means on the following topics: demographics, sleep patterns, work frame and work-life balance, structure, productivity and feelings. Descriptive statistics for M-type and E-type groups, not mentioned in the text are shown in Table 7.

Demographics. A one-way analysis of variance was run to compare M-type and E-type group means on the following variables: Sex, Marital status, Number of children, Education and Age.

M-types and E-types were quite similar in demographics; both Sex, Marital status, Number of children and Education, though they did show significant difference in Age ($F(1, 61) = 6.242$, $p = .01$).

Sleep patterns. A one-way analysis of variance was run to compare M-type and E-type group means on the following variables: Hours of sleep, Hours of sleep needed to be rested, Sleep pattern feels natural, Sleepiness measure for all time frames, Number of naps per week and Length of naps.

Mean Hours of sleep for the total sample was 6hours37 (SD = 48 min, 53% reported to sleep 7hours, 37% reported to sleep 6 hours or less, 9% reported to sleep 8hours or more). M-types and E-types reported significant difference in how many Hours of sleep they needed to be rested ($F(1, 59) = 14.37$, $p < .001$). M-types reported that they on average needed 7hrs22 (SD = 35 min), whereas E-types reported 8hrs10 (SD = 61 min).

On average, both M-types and E-types slept 6hrs32 (M-types SD = 58 min, E-types SD = 42 min). Whether or not respondents felt their Sleep pattern reflected what was natural for their own body was significantly different between the two groups ($F(1, 59) = 31.86$, $p < .001$). M-types reported the Sleep pattern to be slightly more natural ($M = 1.29$, $SD = 1.40$), while E-types reported the sleep pattern to be slightly more unnatural ($M = -1.00$, $SD = 1.60$).

In the morning (7-11 am), Sleepiness was significantly higher for E-types than M-types in general. In the 7-9 am slot E-types scored higher than M-types (E-types $M = 3.26$, $SD = 1.28$, M-types $M = .69$, $SD = .95$), $F(1,59) = 76.64$, $p < .001$, and in the 9-11 time slot E-types scored higher than M-types (E-types $M = 1.95$, $SD = 1.58$, M-types $M = .36$, $SD = .53$) , $F(1, 59) = 34.49$, $p < .001$). Later in the day the groups' feeling of sleepiness was more similar. M-types were somewhat Sleepier than E-types after 5 p.m. (M-types $M = 2.36$, $SD = 1.38$, E-types $M = 1.79$, $SD = 1.48$), but this difference was not significant ($F(1, 59) = 2.13$, $p = .15$. How often E- and M-types reported Napping was not significantly different, but how Long they slept was ($F(1, 59) = 6.47$, $p = .01$). E-types Slept on average 32minutes (SD = 27 min), whereas M-types slept only 15 minutes on average (SD = 20min).

Work frame and work-life balance. A one-way analysis of variance was run to compare M-type and E-type group means on the following variables: Start time match, End time match, Hour spent on work in leisure time, Need for flextime and Importance of flextime possibilities in choice of work.

The deviation from respondents Ideal work start and work end was significantly different for the two groups (see Table 6). E-type reported that their work day starts over 1 hour earlier ($F(1, 59) = 25.97$, $p < .001$) and ends over half an hour earlier ($F(1, 59) = 20.19$, $p < .001$) than what they would think of as ideal. M-types, on the other hand, reported their workday starting at a right time for them, and ending over half an hour later than what they think would be ideal. The groups did not differ in how much Time they spent on work in their leisure time. Findings suggest that M-types experience a better work-life balance than E-types.

Table 6

Descriptives; Work frame for people with flextime possibilities

	Morning-Types (N=32)		**Evening-Types (N=13)**	
	M	SD in minutes	M	SD in minutes
Start of work day				
1. Flextime start	6:10 am	127	6:05 am	165
2. Ideal start	7:52 am	37	9:00 am	122
3. Real start	7:49 am	24	7:55 am	62
4. Core time start	9:04 am	68	8:55 am	38
5. Dev. 3-2	-4 min	34	-65 min	76
6. Dev. 1-2	-103 min	126	-175 min	131
7. Dev. 4-2	71 min	76	-5 min	142
End of work day				
8. Flextime end	7:10 pm	210	6:32 pm	250
9. Ideal end	3:30 pm	34	4:32 pm	124
10. Real end	4:05 pm	41	3:51 pm	48
11. Core time end	2:58 pm	72	2:51 pm	41
12. Dev. 10-9	35 min	46	-41 min	93
13. Dev. 8-9	220 min	215	120 min	309
14. Dev. 11-9	-32 min	76	-101 min	128

Note. Dev. = Deviation score, 5.= Start time match, 6.= Start flextime match, 7.= Start core time match, 12.= End time match , 13.= End flextime match , 14.= End core time match

Both M-types and E-types reported high usage of flextime possibilities to make the work day fit their own needs (M-types $M = 3.00$, $SD = 1.59$, E-types $M = 3.31$, $SD = 1.44$ out

of a 0-5 likert scale, no significant differences). The self reported *need* for flextime possibilities was significantly different for M-types (M = 2.97, SD = 1.87) and E-types (M = 4.46, SD = .66) ($F(1, 46) = 7.80$, $p = .008$), however, indicating a greater perception of need for flextime among E-types.

How much flextime possibilities means in choice of work was different for the two groups, but not significant ($F(1, 46) = 8.04$, $p = .08$). M-types reported $M = 2.77$ ($SD = 1.65$), whereas E-types reported $M = 3.69$ ($SD = 1.38$) on a 0-5 likert scale.

Structure. A one-way analysis of variance was run to compare M-type and E-type group means on the following variables: Freedom to structure the work day, Taking advantage of possibility to structure the work day and Structure the work day to fit own feel-best times.

M-types and E-types show no significant differences in how Free they were to structure their day, how much they Took advantage of this possibility, or how much they Structured their work day to fit their feel-best time.

Productivity. A one-way analysis of variance was run to compare M-type and E-type group means on the following variables: Time used to finish a work task and Quality of work.

No significant difference was found between M-types and E-types regarding Quality of work or Time spent on finishing a work task.

Feelings. A one-way analysis of variance was run to compare M-type and E-type group means on the following variables: Job satisfaction, HINT, Positive affect, negative affect, Affect balance and Stress at work.

No significant differences were found between M-types and E-types regarding Job satisfaction, HINT or ABS (Negative affect, Positive affect, Affect balance). M-types and E-types reported different amount of experience of Stress at work, but the difference was not significant ($F(1, 51) = 2.05$, $p = .15$).

Table 7
Descriptives for M-types and E-types

Measure	Scale	M-types		E-types	
		M	SD	M	SD
Number of children	0-20	0.53	0.80	0.90	1.17
Age	Open ended	50.91	10.71	43.10	11.96
Marital status	0 to 2	1.56	0.83	1.25	0.97
Education	0 to 4	3.35	1.07	3.55	0.87
Sex	0 = M, 1 = F	0.77	0.48	0.85	0.37
Hours of sleep	1-15	6.55	1.97	6.53	1.70
Hours of sleep needed to be rested	1-15	7.38	0.58	8.16	1.02
Sleep pattern feels natural	-3 to +3	1.29	1.40	-1.00	1.60
Sleepiness 7 am to 9 am	0 to 5	0.69	0.95	3.26	1.28
Sleepiness 9 am to 11 am	0 to 5	0.36	0.53	1.95	1.58
Sleepiness 11 am to 1 pm	0 to 5	0.81	0.94	0.79	1.23
Sleepiness 1 pm to 3 pm	0 to 5	1.60	1.31	1.58	1.74
Sleepiness 3 pm to 5 pm	0 to 5	1.79	1.42	1.63	1.46
Sleepiness after 5 pm	0 to 5	2.36	1.38	1.79	1.48
Number of naps per week	1-7	1.24	1.71	2.05	1.99
Hours of work in leisure time	Open ended	4.95	9.89	4.39	4.54
Freedom to structure work day	0 to 5	3.47	1.15	3.61	0.92
Taking advantage of structuring	0 to 5	3.35	1.27	3.56	1.04
Structuring to fit feel-best times	0 to 5	1.93	1.49	2.00	1.24
Time to finish a work task	5 statements	1.63	0.97	1.80	0.94
Quality of work	5 statements	2.21	0.99	2.00	1.13
Job Satisfaction	-3 to +3	1.89	1.16	1.43	1.41
HINT	1 to 7	2.56	1.71	2.86	1.70
Positive affect	0 to 5	0.70	0.18	0.72	0.26
Negative affect	0 to 5	0.23	0.26	0.28	0.21
Affect balance	0 to 10	7.26	1.79	7.20	1.82
Stress	0 to 5	2.76	1.45	3.27	1.16

Note. Marital status: 0 = Single, 1 = Not living with partner, 2 = Livning with partner. Education: 0 = No education, 1 = High school, 2 = certificate of completed apprenticeship, 3 = 3 years higher education, 4 = 5 years or more higher education

Summary. E-types and M-types were different in subjective need of sleep, but not in actual amount of sleep before a work day. E-types were sleepier within limited time frames than the other group. There were no significant differences for the groups regarding measures of feelings. Both groups reported taking high advantage of flextime possibilities, and were not different in the degree to which they structured their work days.

Flextime (FT) Dimension

Six one-way analyses of variance were then run to compare wFT and woFT group means on the following topics: demographics, sleep patterns, work frame and work-life

balance, structure, productivity, and feelings. Descriptive statistics for wFT and woFT groups, not mentioned in the text are shown in Table 8.

Demographics. A one-way analysis of variance was run to compare wFT and woFT group means on the following variables: Sex, Marital status, Number of children, Education and Age.

Respondents with flexible work arrangements (wFT) were not significantly different from respondents without flexible work arrangements (woFT) regarding Sex, Age, Education, Marital status or Number of children.

Sleep patterns. A one-way analysis of variance was run to compare wFT and woFT group means on the following variables: Hours of sleep, Hours of sleep needed to be rested, Sleep pattern feels natural, Sleepiness measure for all time frames, Number of naps per week and Length of naps.

There was no significant difference in Circadian rhythm classification, -based on whether or not respondents had Flextime possibilities. Daytime sleepiness in the time frame 11 am to 1 pm was overall very low, but still significantly higher in the group wFT ($F(1, 244) = 3.93$, $p = .05$). The same applied for the Timeframe 1 pm to 3 pm ($F(1, 244) = 4.74$, $p = .03$).

How long naps in the afternoon was also significantly different for the two groups ($F(1, 244) = 9.84$, $p = .002$). WoFT respondents slept on average 35 minutes ($SD = 52$ min), while wFT respondents slept on average 19 minutes ($SD = 22$ min), the amount of Naps per week was not significantly different.

The two groups did not differ significantly in Hours of sleep, how many Hours of sleep needed to be rested, or how Natural they felt their sleep pattern was.

Work frame and work-life balance. A one-way analysis of variance was run to compare wFT and woFT group means on the following variables: Start time match, End time match, Hour spent on work in leisure time, Need for flextime and Importance of flextime possibilities in choice of work.

Deviation between start of work day and ideal start of work day was significantly different for the two groups ($F(1, 244) = 6.56$, $p = .01$), whereas this was not the case for the end of the work day. WoFT respondents reported their work day starting 52 minutes too early ($SD = 60$ min). WFT respondents reports work day starts 27 minutes too early ($SD = 48$ min). For the end of the workday, the difference between groups was very small (respondents woFT, $M = 6$ minutes to early ($SD = 71$ min), wFT, $M = 7$ minutes to late ($SD = 62$ min)). How much time people spend on Work in their leisure time was significantly different ($F(1,$

225) = 6.98, p = .009), people woFT used an average of 6hrs23 per week (*SD* = 4hrs40), while people wFT used an average of 3hrs22 per week (*SD* = 9hrs44). Findings suggest respondents wFT experiencing better work-life balance than respondents woFT.

Respondents with flextime possibilities, reports that their Ideal workday begins earlier than the Core time starts, and end later than the Core time ends. In other words, the core time does not seem to be a challenge when trying to make the ideal work day.

The self reported *need* for flextime possibilities was significantly different for wFT (*M* = 3.37, *SD* = 1.46) and woFt (*M* = 2.23, *SD* 1.70) (F(1,225) = 13.63, p < .001), however, indicating a greater perception of need for flextime among respondents that already had this possibility.

How much Flextime possibilities means in choice of work was different for the two groups, but not significant (F(1,225) = 24.63, p < .001). WFT reported *M*=3.18 (*SD*=1.58), whereas woFT reported *M*=1.54 (*SD*=1.61) on a 0-5 likert scale.

Structure. A one-way analysis of variance was run to compare wFT and woFT group means on the following variables: Freedom to structure the work day, Taking advantage of possibility to structure the work day and Structure the work day to fit own feel-best times.

How free people were to structure their own work day was significantly higher for people with flextime than for people without FT (F(1, 225) = 15.32, p < .001). How much people took advantage of this possibility to structure and plan their work day was also significantly higher for respondents with flextime (F(1, 225) = 4.49, p = .04). Whether or not people Structured their work day to fit their own feel best time was not significantly different.

Productivity. A one-way analysis of variance was run to compare wFT and woFT group means on the following variables: Time used to finish a work task and Quality of work.

The time used to finish a work task were significantly different for the two groups (F(1, 212) = 4.11, p = .04), people wFT reported using more time finishing a task than did people woFT. There were no significant differences between wFT and woFT people regarding Quality of work.

Feelings. A one-way analysis of variance was run to compare wFT and woFT group means on the following variables: Job satisfaction, HINT, Positive affect, Negative affect, Affect balance and Stress at work.

There were no significant differences between people wFT and people woFT regarding Job satisfaction, HINT, Negative affect or Affect balance. However, respondents wFT had lower scores on Positive affect than respondents woFT (F(1, 213) = 8.00, p = .005),

though the groups were both over average on the likert-scale. WFT People experience significantly less stress at work than do woFT people ($F(1, 212) = 7.43$, $p = .007$).

Table 8
Descriptives for wFt and woFT

Measure	Scale	wFt		woFT	
		M	SD	M	SD
Number of children	0-20	0.74	0.97	0.83	1.02
Age	Open ended	46.17	10.81	45.00	12.20
Marital status	0 to 2	1.56	0.79	1.63	0.77
Education	0 to 4	3.32	0.98	3.37	0.93
Sex	0 = M, 1 = F	0.75	0.43	0.77	0.43
Hours of sleep	1-15	6.64	0.81	6.53	0.90
Hours of sleep needed to be rested	1-15	7.72	0.87	7.93	0.98
Sleep pattern feels natural	-3 to +3	0.42	1.69	0.27	1.60
Sleepiness 7 am to 9 am	0 to 5	2.00	1.46	1.63	1.52
Sleepiness 9 am to 11 am	0 to 5	0.90	1.09	0.73	0.98
Sleepiness 11 am to 1 pm	0 to 5	0.82	0.95	0.47	0.68
Sleepiness 1 pm to 3 pm	0 to 5	1.55	1.31	1.00	1.17
Sleepiness 3 pm to 5 pm	0 to 5	1.88	1.38	2.03	1.38
Sleepiness after 5 pm	0 to 5	2.05	1.37	2.50	1.59
Number of naps per week	0-7	1.46	1.72	1.77	1.81
Hours of work in leisure time	Open ended	3.37	4.67	6.38	9.73
Freedom to structure work day	0 to 5	3.71	1.02	2.75	1.60
Taking advantage of structuring	0 to 5	3.59	1.13	3.04	1.55
Structuring to fit feel-best times	0 to 5	2.09	1.45	2.29	1.70
Time to finish a work task	5 statements	1.84	0.91	1.44	1.04
Quality of work	5 statements	2.05	0.96	2.28	0.89
Job Satisfaction	-3 to +3	1.57	1.27	1.88	1.24
HINT	1 to 7	2.80	1.75	2.26	1.51
Positive affect	0 to 5	0.66	0.20	0.78	0.19
Negative affect	0 to 5	0.26	0.24	0.26	0.24
Affect balance	0 to 10	6.96	1.74	7.60	1.53
Stress	0 to 5	2.69	1.06	3.32	1.25

Note. Marital status: 0 = Single, 1 = Not living with partner, 2 = Livning with partner. Education: 0 = No education, 1 = High school, 2 = certificate of completed apprenticeship, 3 = 3 years higher education, 4 = 5 years or more higher education

Summary. Compared to respondents woFT respondents withFT reported less experienced stress and less time spent on work during the leisure time, less deviation between their actual and ideal start of work day, and sleeping shorter naps in the afternoon. Respondents wFT were freer to structure their work day, and took more advantage of the possibility to structure, than respondents woFT. Respondents with FT experienced more

daytime sleepiness, less positive affect and used longer time to finish a work task than people woFT. There was no significant difference between the groups regarding job satisfaction, negative emotions and affect balance.

M-Types and E-Types with Flextime

An Independent samples *t*-test was conducted to compare M-types and E-types with flextime possibilities for the condition of Taking advantage of the possibility to make the work day fit own needs. M-types (M = 3.00, SD = 1.59 out of a 0-5 Likert scale) and E-types (M = 3.31, SD = 1.44 out of a 0-5 Likert scale) were not significantly different in How much they took advantage of the flextime possibilities ($F(1, 46) = .37$, $p = .55$).

Test of the Models; Main Hypothesis (1), and Hypothesis 10

Descriptive statistics were run for all of the variables in the model, Exploring skewness and kurtosis. Values within the range of +/- 2 for skewness and +/- 7 for kurtosis are considered to be normally distributed (West, Finch & Curran, 1995). All variables except from Flextime (Skewness = -2.36, Std. Error = .16) were within this limit. This exception was not unexpected.

Kenny (2011) reviewed RMSEA as model fit measure, and stated that MacCallum, Browne and Sugawara (1996) had used 0.01, 0.05 and 0.08 to indicate excellent, good, and mediocre fit, while others have suggested 0.10 as the cutoff for poor fitting models.

Model fit for the hypothesized (1) model (Figure 3), was good ($\chi 2$ (9, N = 215) = 11.22 (p = .26), CFI = .98, RMSEA = .03 (CI = .00 - .90)). Based on this, the main hypothesized model was supported.

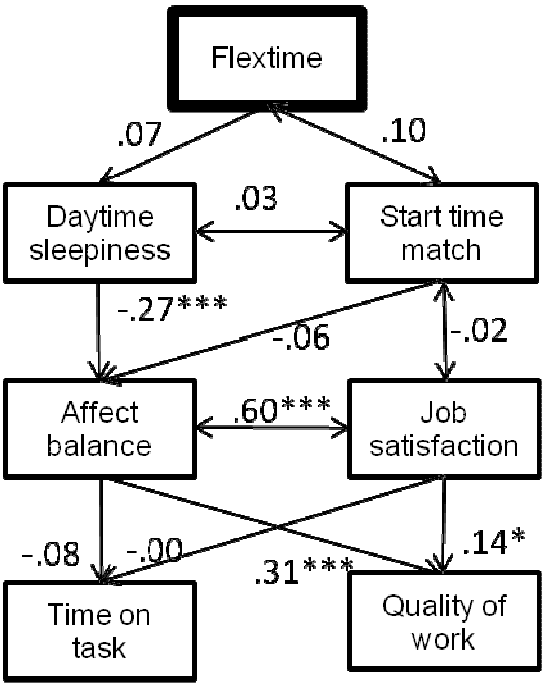


Figure 3. Test of main hypothesis (1) – standardized model results. Model fit: χ2 (9, N = 215) = 11.22 (p = .26), CFI = .98, RMSEA = .03 (CI = .00 - .90). The model was not tested for M- and E-types individuals separately because of grouping difficulties explained prior to the analysis.

The model for hypothesis 10 showed a rather poor fit (χ^2 (50, N = 219) = 775.05 (p < .001), CFI = .42, RMSEA = .26 (CI = .24 - .27)), resulting in not supporting the hypothesis (Figure 4).

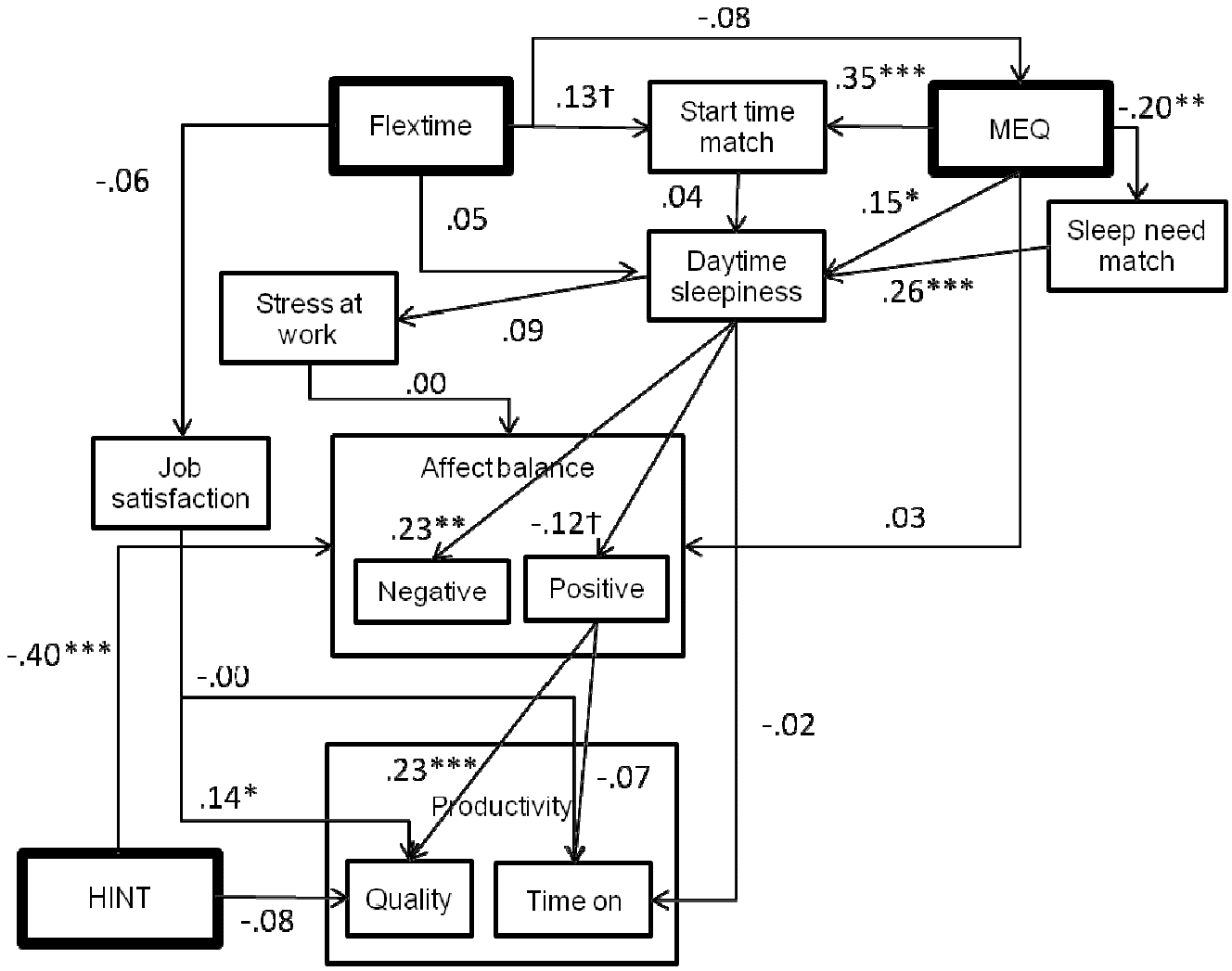


Figure 4. Test of hypothesis 10- Standardized model results. Model fit: $\chi 2$ (50, N = 215) = 2409.42 ($p < .001$), CFI = .05, RMSEA = .47 (CI = .45 - .49)

Because of poor fit for hypothesized model (hypothesis 10), a modified model was proposed in order to explain the data better. See Figure 5. This model had an acceptable model fit (mediocre fit, according to MacCallum, Browne and Sugawara (1996).

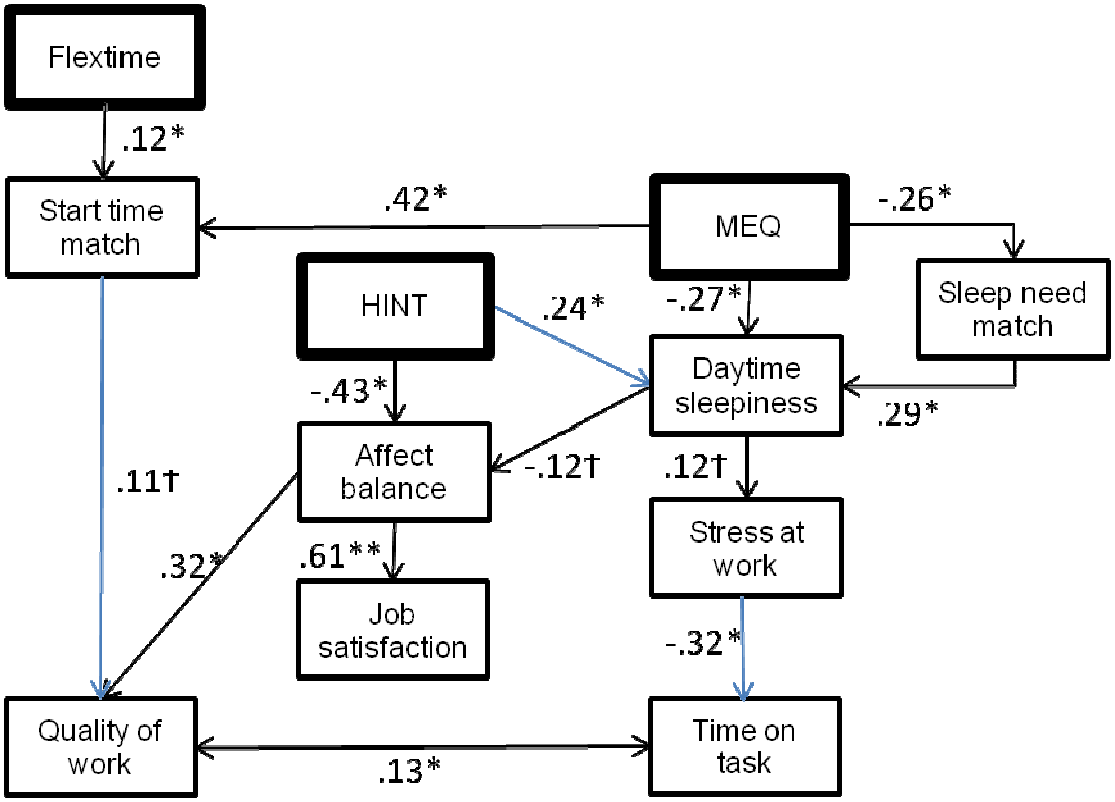


Figure 5. Modified path analysis - Standardized model results. Model fit: χ2 (35, N = 224) = 66.05 (p = .004), CFI = .92, RMSEA = .06 (CI = .04 - .08). Black arrows shows hypothesized connections, blue arrows shows connections not included in the hypothesized model.

Discussion

Even though E-types reported Needing more sleep than M-types they did not Sleep any more the night before a work day, thus reporting Sleep pattern being more unnatural, being Sleepier in the morning and taking Longer naps in the afternoon than M-types. Employees wFT reported less experienced Stress, less Time spent on work in leisure time, and less Deviation between ideal and real work day. They were also Sleepier, experienced less Positive affect, and used longer Time to finish a work task compared to employees woFT. Over a third of the respondents slept six hours or less before a work day, this can possibly be problematic little sleep. Model testing showed Productivity (in particular Quality of work) was through variables connected to both Flextime and Circadian rhythm.

Scale Validation

The measure for Daytime sleepiness, covering the time frame when people usually were expected to be at work (9 am to 5 pm) did not show as good validity as when the time frame was limited to 11 am to 5 pm. The challenge with braking up Daytime sleepiness like this is that it may not be as comparable to other findings regarding daytime sleepiness given its focus on such a short time frame of the day. According to table 1, however, the question about Sleepiness from 9 am to 11 am was too similar to comparable to Circadian rhythm (rMEQ) items, and would have created interference in the path analysis, if included in the scale. On the other hand, construct validity and Cronbach's Alpha for HINT in the current study was as good as that reported in earlier research (Verplanken et al. 2007)

The reliability test showed the Affect balance scale to be poorer in the current study, than the developer (Bradburn, 1969) of the scale reported it to be. This could be due to sampling error.

Sampling

In 1990 it was stated that flextime was used more and more (Christensen, 1990). It is possible that the increased use of FT has expanded even more over the years. According to numbers from Statistics Norway (SSB) in 2004, one out of three employees in Norway was offered FT (Bø, 2004). In general FT was most common in professions that required higher degrees of education (Bø, 2004). In the current study's sample 59% of all the respondents had 5 years or more University education, 26% had 3 years university/academy education, and only 15% had less than 3 years higher education. The high level of Education among the people who participated in the study could have been a possible explanation for the different sample size for these two groups. On the contrary, wFT and woFT respondents did not show significant difference in their levels of Education. Another possible explanation could be how

the sampling was done; respondents were recruited via e-mail and other online media. This could have increased the possibility of employees working in offices, connected to a computer, having greater access to the questionnaire than employees working in other arenas. One could assume that craftsmen working in jobs without FT were excluded from the sample because of this sampling method.

As a consequence, these two hypotheses could not be investigated properly;

$Hypothesis_6$: Evening-types with no Flextime possibility report lower Job satisfaction, more Daytime sleepiness, and higher levels of HINT than morning-type coworkers.

$Hypothesis_7$: Evening-types with no Flextime are less Productive and Sleepier than the other groups.

Morningness-Eveningness Dimension

Even though E-types reported Needing more sleep than M-types they did not Sleep any more the night before a work day, thus reporting Sleep pattern being more unnatural, being Sleepier in the morning and taking Longer naps in the afternoon than M-types. E-types imagined their ideal work day more different from their real work day compared to M-types. Both E-types and M-types reported Taking advantage of the possibility to adjust schedules and Structuring their work day to fit own needs.

Age was significantly higher for morning- than for evening-type respondents. This result supported earlier findings about people tending to shift toward morningness later in life (Vink et al., 2001).

There was no significant difference between the groups on Sleep per night. The only difference was in the Length of naps in the afternoon. Therefore $Hypothesis_2$ (There are differences between evening- and morning-types regarding sleep patterns) was only partly supported.

Daytime sleepiness was higher for E-type individuals in the beginning of the day, but not later in the day, and there were no differences in aspects of feelings. Therefore the first part of the $Hypothesis_3$ (Evening-types report more Daytime sleepiness, …) was partly supported (… more Negative emotions and less Positive emotions than morning-type coworkers), while the second and third part of the hypothesis were not supported in total.

E-type reported that they Needed almost an hour more sleep (8hours10) to be rested than M-type did (7hours22). Based on this finding one could assume that E-types would sleep more before a work day than their M-type colleagues, but analyses showed that there were no differences in how much people in either group Slept, based on their Circadian

rhythm. On average both M-types and E-types Slept 6hours32. This result was not in accordance with Hidalgo et al.'s (2003) findings about evening-type individuals reporting a shorter total amount of sleep than the other groups. Hidalgo et al.'s finding was supported by Clodoré et al. (1990), but not by Taillard et al. (1999). Hildago et al (2003) suggest that these differences in findings may reflect differences in the samples studied, as their own study was based on young adults. This explanation could may be applied for why the current results conflicted with Hidalgo et al.'s (2003); the mean age for the current sample were 46 years.

M-types reported their sleep pattern to be more natural for them than E-types, who reported their sleep pattern to be more unnatural for them. This could be argued to be a logical age-related result as mentioned above. Even though both groups reported Sleeping less than what they reported they really needed, the difference nevertheless was greater for E-types.

Daytime sleepiness was not significantly different for the two groups throughout the day, only for limited time frames. From 7 am to 11 am, E-types were significantly sleepier than M-types, but there was no difference later in the day. According to Hidalgo et al.' (2003) evening type individuals reported a greater daytime sleepiness (ESS) compared to morning- and intermediate type individuals. Our results were difficult to compare with Hidalgo et al.'s since the measure for daytime sleepiness in the current study was quite different from the ESS-measure used by Hidalgo et al. (2003).

When imagining their ideal work day, E-types reported that their work day started over 1 hour earlier than they would like, and M-types reported their workday started at the right time compared to their ideal. This could be argued to have an impact on daytime sleepiness, or that sleepiness in the morning contributed to make E-type feel they should have not been at work yet.

The findings about Circadian rhythm and Daytime sleepiness in the current study were not surprising, as the rMEQ includes an item measuring how sleepy respondents felt the first half hour after waking up in the morning. Since one measure of "morning sleepiness" contributed to represent people's circadian rhythm, correlation with another measure of "morning sleepiness" could be argued to not be an interesting finding at all.

When combining the results related to actual sleep and needed sleep, with the results of daytime sleepiness, the next results seem logical: when E-type and M-type had naps in the afternoon, they slept a significantly different number of minutes. On average, E-types slept 32 minutes, whereas M-types slept only 15 minutes. The explanation could be that E-type

individuals sleep less than needed in the night, are more tired in the morning, and then compensate for this by taking longer naps in the afternoon.

Even though E-types reported a significantly higher need for flexible work arrangements than M-types, there was no significant difference in how much E-types and M-types availed themselves of the FT possibilities. Both M-types and E-types with flextime reported high usage of flextime possibilities in order to make the workday fit their own needs. Therefore $Hypothesis_5$ (When flextime is available, evening-types report they Take more advantage of the possibility to adjust their workdays than do morning-types.) was not supported.

How much FT means in choice of work was different for the two groups, but not significant. Therefore $Hypothesis_6$ (Evening-oriented people tend to select jobs with flextime) was also not supported.

M-types and E-types showed no significant differences in how Free they were to structure the day, how much they Used this possibility, how much they Structured their work day to fit their feel best time, or how much Time spent on work in the leisure time. Therefore $Hypothesis_8$ (Both morning- and evening-types structure their work tasks in order to match their feeling-best times, independent of flextime) was supported.

Flextime Possibilities

Nearly 25 years ago, Christensen (1990) stated that researchers had not found compelling support for positive effects of using flexible work arrangements as hoped for. The current study did find some positive support for the use of flextime, however. Compared to respondents woFT respondents with flextime reported less experienced Stress and less Time spent on work during the leisure time, less Deviation between their actual and ideal start of work day, and Sleeping shorter naps in the afternoon. However, the overall results were mixed since the current study also found some negative effects. People with FT experienced more Daytime sleepiness, less Positive affect and used longer Time to finish a work task than people woFT.

One could assume that longer Time spent to finish a work task would enhance work Quality, but there were no significant differences between the groups regarding reported work Quality. In fact there was no correlation between these two productivity measures at all. Findings showed that respondents wFT were freer to structure their work day, and took more advantage of the possibility to structure, than respondents woFT. This finding was logically expected, and gave foundation for a thought; Deadlines often put us in gear. Having to get

things done within a predetermined time span serves the same purpose? When we have the option to extend our day to work on a task, perhaps that makes us less efficient.

Although levels of experienced Stress was lower for the group with flextime, Stress did not correlate at all with either Positive affect or Job satisfaction. Jang (2010) found that previous research showed flexible work arrangements to be associated with increases in job satisfaction. The current study did not support these earlier findings, showing no difference regarding Job satisfaction for the two groups. Positive affect has been used in measuring job satisfaction (Zelenski et al., 2008). Surprisingly, Positive affect was lower for individuals with flextime than for the group without flextime in this study, even though both groups scored above the midpoint on the Likert scale.

People with FT spent 3 hours less per week on Work in their leisure time that the other group. There may be two possible explanations for this. First, wFT people actually use fewer hours in their leisure time to work because, as findings show, they were freer to structure their workday and take more advantage of this possibility, compared to people without FT. Therefore they likely got more of their work done before going home. However, wFT people also reported using more time to finish a work task. This seems like a contradiction and is hard to interpret. The second explanation could be that many wFT people were able to work at home, counting these hours as "work hours", and banking them for later. Therefore, wFT respondents didn't count these hours as hours of work in their leisure time. Meanwhile, it could well be that woFT people had a more non-negotiable view of what was leisure time and what were working hours.

WFT Respondents had less Deviation between their actual and idea start of the work day. This supported flextime as being a program that enabled people to work within more ideal time frames according to own needs. The literature review gave background for expecting that flextime could decrease experience of Sleepiness on the job, whereas analyses showed that this is not the case for our study's sample, in fact it was the opposite.

Based on whether or not respondents had flextime possibilities, results showed no significant difference in Circadian rhythm. Therefore the $Hypothesis_4$ (There is a connection between people's work schedules (Flextime) and their Circadian rhythm classification) was not supported. According to Monk (2005) external factors such as work schedules have been shown to play a part in the circadian rhythm. The current study could not support this. The difference in findings could be due to sampling error.

Findings Common for all Participants

37% of all respondents in the current study reported sleeping 6 hours or less. Banks and Dinges (2007) stated that by routinely getting fewer than seven hours of sleep per night, people can display cognitive deficits similar to those seen in people with one to three nights of total loss of sleep. It can be argued to be of concern that over one third of employees in this study could possibly display this amount of cognitive deficits when they were at work. The author support Dirkson and Epstein (2008) suggestion for employees being educated about the importance of sleep and sleep hygiene, thus perhaps enhancing performance at work. Rosekind (2005) stated that people could get so accustomed to being sleepy they no longer recognized they were sleepy, and could misperceive to which extent their abilities were impaired by sleepiness. Based on this, the author suggested subjective measures of sleepiness could give inaccurate or false values.

Results showed that HINT correlated strongly negative with both Affect balance and Positive affect, and correlated strongly positive with Negative affect and reported Quality of work. The $Hypothesis_9$ (HINT is significantly related to how people respond on questions regarding well-being and evaluation of their own work) was therefore supported. This means that the tendency employees have for negative thinking to occur often, unintentionally or unconsciously, and being hard to control affects their psychological well-being and quality of work. Employees with lower scores on the scale are more likely to be cheerful at work, and satisfied with their work place. It can be argued that the tendency of negative thinking is a valuable variable to control for when looking at job satisfaction. Higher scores on the scale were related to employees reporting lower quality for the work they performed. This can be argued to indicate one of two things; the first explanation is that negative thinking, that has been shown strongly related to self esteem (Verplanken et al, 2007), makes employees judge their own work to be of poorer quality than it perhaps really is. The second explanation is that negative thinking aggravates quality of the work, because of poor motivation or lack of self-confidence.

Model testing. Two models were hypothesized for the current study. One of the models was dependent on the intended grouping, to be tested properly. For testing the last part of the main $hypothesis_1$, the author would run the same analysis for the two different groups. Instead, because of nature of the study sample and the grouping difficulties that accordingly occurred, the model has been tested for the entire sample, not controlling for circadian rhythm. Testing of this hypothesis was shown in Figure 3. Model fit was good

(MacCallum et al., 1996). Therefore the main $Hypothesis_1$ (Organizations with Flexible work arrangements for employees will have more rested employees who experience better work-life balance, which in turn leads to employees with high scores on well-being and Job satisfaction, and therefore productive workers as the happy-productive worker thesis claim. This will be especially relevant for evening-oriented people who are the ones in biggest need for flextime opportunities.), except from the last part that could not be tested, was supported.

Even though the hypothesized model was not tested for both groups, it clearly showed the links from Flextime to productivity measures. The strongest path coefficients in this model went from Daytime sleepiness, through Affect balance and Job satisfaction, to Quality of work. The coefficient from Daytime sleepiness to Affect balance was negative, meaning the higher levels of Daytime sleepiness, the lower levels of Affect balance, and vice versa. Meanwhile, path coefficients, between Affect balance, Job satisfaction and Quality of work were positive, meaning Affect balance and Job satisfaction contributed positively to Quality of work. Thus, the current study supported the previous findings about daytime sleepiness being associated with decreased work productivity, less positive affect and more irritability (negative affect) (Mulgrew et al., 2007; Johnson et al., 1999; Gaultney & Collins-McNeil, 2009). Even though the model did not separate between Positive and Negative affect, the Affect balance would fluctuate from good balance if Positive affect was low, and Negative affect was high such that affect as a single concept was viable.

Despite low path coefficients, the model was good with Flextime as a predictor for Daytime sleepiness and Start time match. This supported earlier findings about employees with flexible work hours reporting higher levels of work-life balance, which in turn was associated with positive paths to well-being (Jang, 2010). Based on this model, the author suggests organizations should continue to offer flextime possibilities to their employees, to enhance productivity, - quality of work, in particular.

The other model that was hypothesized could be tested without any grouping of variables. The aim of this hypothesis was to explore earlier findings within a larger model (Figure 4). The path analysis revealed some strong path coefficients, but also many weak coefficients. Also, the model fit was poor. Therefore the hypothesized model ($Hypothesis_{10}$: Connections described in the literature review can be found within a larger model, along with HINT) was not supported. The finding did nevertheless give the impression that HINT might being a valuable variable to include in this kind of model, because of its strong path coefficient to Affect balance.

Because of poor fit for this hypothesized model, a modified model (Figure 5) was constructed to try to explain the data better. This model had an acceptable model fit (mediocre fit, according to MacCallum et al., 1996). The modified model that was used to explain the relations from Flextime possibilities and Circadian rhythm to well-being and productivity may not be definite. Other explanations could exist.

In the modified model (Figure 5), path coefficients showed that Circadian rhythm was a good predictor for Start time match, Sleep need match and Daytime sleepiness as hypothesized. Start time match was also predicted by Flextime, as hypothesized, but showed no direct prediction for Daytime sleepiness. Job satisfaction was only predicted by Affect balance in this model, and Affect balance was predicted by Daytime sleepiness and HINT. The two productivity measures were shown to be predicted by different variables. First, Quality of work was predicted by Affect balance and Start time match. Second, the Time used to finish a work task was predicted by Daytime sleepiness through Stress. Lim and Dinges (2008) found that sleep deprivation enhanced the "time-on-task" effect because of slowing in response. This explanation is valuable in understanding the model.

The modified model shows that productivity measures are through variables connected to both Flextime and Circadian rhythm, in this manner supporting the author's suggestion that it can be beneficial for both organizations and employees when employees are offered flextime possibilities, allowing them to adjust work schedules to accommodate circadian rhythms. The employees experience less deviation between the ideal and the real work day, thus having a better work-life balance regarding this aspect, and the employees report better quality for their performed work in the organization. The author wanted to bring out the interesting aspect revealed in the qualitative study done prior to this survey, - Flextime being something that motivates and make the employees wanting to give something back to organization, through maintaining high quality of their work. This was a view that was fronted by respondents with flextime possibilities, and can possible explain the findings mentioned above.

Baltes et al. (1999, in Ng et al., 2006) found that alternative work schedules had positive effects on job satisfaction. The first hypothesize model (Figure 3) in the current study indirectly supported this. On the other hand, Hicks and Klimoski (1981) did not find support for flextime having an impact on job satisfaction. The modified model for hypothesis 10 (Figure 5) supported this finding, whereas in this model, Flextime had no direct or indirect effects on Job satisfaction.

Earlier studies had found that Happiness, particularly positive affect, was positively related to high productivity (Zelenski et al., 2008, Kaplan et al., 2009). The first hypothesized model (Figure 3) and the modified model supported this for Quality as a productivity measure, as it was strongly predicted by Affect balance. Time used to finish a work task was predicted by Daytime sleepiness, through experienced Stress in the modified model. It can be argued that high levels of experienced Stress can be seen as low happiness, on the other hand Stress was not correlated to any aspect of the measured psychological well-being.

Looking at both supported models, the author states flextime being of importance to employees' productivity.

Limitations for the Study & Implications for Future Research

There were two challenges with the sample that made the planned grouping of respondents difficult; few extreme morning-type respondents and few people without flextime. Earlier research has shown a normal distribution in the Morningness-eveningness dimension, whereas this was more or less also the case in the current study, sample size did not contribute to make sufficient N for the extreme scores. These weaknesses made it hard to investigate all hypotheses made. There would be possibilities for more comparative analyses if there would have been more morning-type individuals and more people without flextime possibilities in the sample.

In general, the author encourages caution in interpreting the flextime results. Even though equal variance could be assumed between the wFT and woFT groups, the sample size of the group without flextime was an inevitable weakness, and resulted in the variable being highly skewed toward wFT.

Future research ought to test the acceptable hypothesized model for the morningness-eveningness extremes separately, to see if model fit would be different for the two groups. To do this it would be necessary to obtain a much larger sample of respondents than were captured in the current study. A larger sample would hopefully have more respondents in the extreme ends of the morningness-eveningness dimension, and the author suggests using sampling method specifically aimed at recruiting equal numbers of respondents with- and without flextime.

Subjective measures of sleepiness could give inaccurate or false values. It is therefore recommended that other ways of measuring Daytime sleepiness be assessed for use in future studies.

Work-life balance and well-being are broad terms, and are not necessarily represented by the same measures in other studies. This can make comparisons difficult.

The questions about external pressure on work day schedule were only to be answered by respondents with flextime possibilities. This occurred because of the phrasing in the main stem of the question; "what influences your use of flextime possibilities". All respondents should have been given the option to answer that question. A suggestion for a better phrasing in future research could be; "Rate the following factors regarding how much they conflict with your workday". In that way, both respondents working with and without flextime would be queried the same way and enable a group comparison.

The Reduced version of the MEQ did not yield a very high Alpha coefficient. This made the rMEQ as a sorting variable weaker than expected. It might be a good idea for future research to use the complete Morningness- Eveningness Questionnaire to avoid this pitfall.

The 1969 version of the Affect Balance Scale did not show as good internal consistency or reliability as desirable in this study. This could be due to the modification made by adding "at work" to the main stem of the question. Future studies may consider not using this modification, finding an improved version of this scale, or another scale for measuring psychological well-being at work.

Results showed that some of the variables, not included in the hypothesis, were valuable contributors for the study. This applied for the questions about napping in the afternoon, and hours of work in leisure time. It is recommended that they not be forgotten in future work related to sleep and work.

Conclusion

The current study has shown support for the importance of flextime possibilities, and has offered an explanatory model for how flextime and circadian rhythm may be connected to job satisfaction, well-being and productivity. Results also showed that, on average, all respondents slept less than what they report they really need, and as much as one third only slept six hours or less before a work day.

With this, the author wanted to remind the reader about the Charles A. Czeisler quote that introduced this study – a quote stating that people cut their productivity drastically by not sleeping (Fryer, 2006).

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