

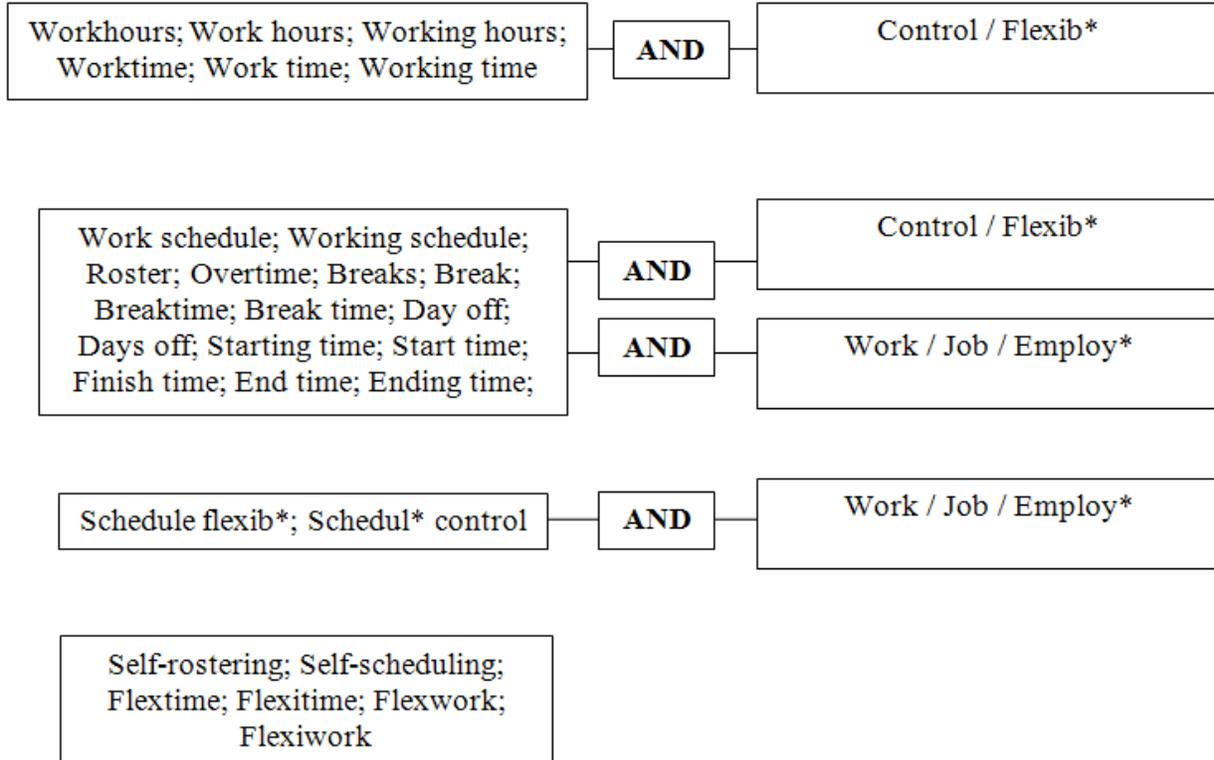
Systematic review on the association between employee worktime control and work–non-work balance, health and well-being, and job-related outcomes ¹

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1 Appendix – Supplementary figure and tables X1–X5

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Supplementary figure: search terms



PsycINFO entry:

((Workhours or work-hours or working-hours or worktime or work-time or working-time) and (control or flexib*)) or ((work schedule or working schedule or roster or overtime or breaks or break or breaktime or break-time or day off or days off or starting time or start time or finish time or end time or ending time) and ((control or flexib*) and (work or job or employ*))) or ((Schedule flexib* or schedul* control) and (work or job or employ*)) or (Self rostering or Self scheduling or Flextime or Flexitime or Flexwork or Flexiwork))

PubMed entry:

(((((Self-rostering[Title/Abstract]) OR Self-scheduling[Title/Abstract]) OR Flex*time[Title/Abstract]) OR Flex*work[Title/Abstract]) OR Self rostering[Title/Abstract]) OR Self scheduling[Title/Abstract]) OR ((((((Workhours[Title/Abstract]) OR Work hours[Title/Abstract]) OR Working Hours[Title/Abstract]) OR Work time[Title/Abstract]) OR Working time[Title/Abstract]) OR Worktime[Title/Abstract]) AND ((Control[Title/Abstract]) OR Flexib*[Title/Abstract])) OR (((((((((((Roster[Title/Abstract]) OR work schedule[Title/Abstract]) OR working schedule[Title/Abstract]) OR overtime[Title/Abstract]) OR breaks[Title/Abstract]) OR break[Title/Abstract]) OR breaktime[Title/Abstract]) OR break time[Title/Abstract]) OR day off[Title/Abstract]) OR days off[Title/Abstract]) OR starting time[Title/Abstract]) OR start time[Title/Abstract]) OR finish time[Title/Abstract]) OR end time[Title/Abstract]) OR ending time[Title/Abstract]) AND (((Work[Title/Abstract]) OR Job[Title/Abstract]) OR Employ*[Title/Abstract]) AND ((Control[Title/Abstract]) OR Flexib*[Title/Abstract])) OR (((Schedul* control[Title/Abstract]) OR Schedul* flexib*[Title/Abstract])) AND (((Work[Title/Abstract]) OR Job[Title/Abstract]) OR Employ*[Title/Abstract]))

Table X1

Global worktime control and its associations

Reference	Sample* ¹	Design/data-collection		Outcome			
		WTC	DV	Analysis reported	Association		
15 Shockley & Allen, 2007 (CS)	230 women only, US. rr not indicated	2 items, $\alpha=.84$; (1) "I have the freedom to vary my work schedule" (2) "I can change the times that I begin and end my workday to fit my personal preferences and needs"	Work-family interference 9 items (Carlson et al.), $\alpha=.89$, e.g. "I am so emotionally drained when I get home from work that it prevents me from contributing to my family."	1, 2	$r = -.23$, $p < .01$ $B = 1.17$, $p < .01$ when controlling for family responsibility $B = NS$ when controlling for organization support	 0	
25 Fenwick & Tausig, 2001 (CS)	2,905, US, rr not indicated	1 item, 2 categories Low vs. High: "Overall, how much control would you say you have in scheduling your work hours: none, very little, some, a lot, or complete flexibility?"	Minor health problems "How often would you say you are bothered by minor health problems such as headaches, insomnia, upset stomach and the like; never, seldom, occasionally, often, or quite often?"	2	$\beta = -.132$ $p < .01$	 +	
			Burnout 5 items, $\alpha=.89$		$\beta = -.230$ $p < .001$	+	
			Distress 6 items, $\alpha=.78$		$\beta = -.823$ $p < .001$	+	
			Dissatisfaction about life 1 item: "All things considered, how do you feel about your life these days?" 1-7		$\beta = -.172$ $p < .001$	+	
			Poor general health status "Overall, how would you say your physical health is these days, excellent, very good, good, fair, or poor?"		$\beta = -.116$ $p < .001$	+	
			Sick leave Number of days absent from work during past 3 months due to personal illness (self reported)		NS	0	
			Lack of work-home balance "to what extent do you feel successful in balancing work and personal or family life?" (1 to 5)		$\beta = -.164$ $p < .001$	+	
			Work-home conflict "How much conflict do you face in balancing your work		NS	0	

				and family life?" 1-5			
26	Tausig & Fenwick, 2001 (CS)	2.958, US rr not indicated	1 item (1-5 response): "Overall, how much control would you say you have in scheduling your work hours: none, very little, some, a lot, or complete flexibility?"	Work life balance 2 items, e.g., "the extent to which worker feels successful in balancing work and personal or family life" (no α indicated)	1, 2	r = NS B=.074, p<.01	+
27	Jang, 2009 (CS)	1200, mixed gender, U.S.	1 item: "How much control would you say you have over your working hours?" (1-5)	Well-being 5 items, α =.76; e.g., "How often have you felt nervous or stressed in the past month" *items analyzed one by one Work life balance 3 items, α =.75; e.g., "How much do your job and your family life interfere with each other?" *items analyzed one by one	1	r = .06 with sleeping disorder, p<.05, ns for other scores r = .09 to .13, p<.01 for all	0 +
28	Schieman & Glavin, 2008 (CS)	2.671, US; rr: 52-61%	1 item: "Overall, how much control would you say you have in scheduling your work hours?" 0 - 4	Work-home conflict 5 items, α =.87; e.g., "How often have you not had enough time for your family or other important people in your life because of your job?"	2	B = -.063 p<.001	+
29	Beutell, 2010 (CS)	2.796 US; rr not indicated	1 item: "overall, how much control would you say you have in scheduling your work hours?"	Work family interference 5 items, α =.87, e.g. "I frequently have no energy to do things with my family because of my job" Work family synergy 4 items, α =.67, e.g. "frequency of having more energy to do things with family because of my job; having more energy at work because of my family/personal life" Job satisfaction 2 items (α =.68): how satisfied are you with your job / would you take the same job again Life satisfaction 1 item, overall satisfaction	1, 2	r = -.19 β = -.21, p<.01 r = .11, p<.001 β = .09, p<.01 r = .23, p<.001 r = .15, p<.001	+

32	Kelly, Moen & Tranby, 2011 (I)	608: 302 intervention group / 306 control; US; 80%rr/90% responded in follow-up; US, 31 years; High educated white collar; Average 48.15 working hours per week	Participation in ROWE (= Results Only Work Environment): yes (1) / no (0) Worktime control reported How much choice do you have over ...when you take vacations or days off? ...when you can take a few hours off? ...when you begin and end each workday? ...over doing some of your work at home or at another location?* ...the amount or times you take work home with you? ...shifting to a part-time schedule if you wanted to do so? ...the total number of hours you work each week? $\alpha=.78 / .85$ for wave 1 / wave 2	Work-to family conflict Netemeyer et al. (1996) scale; 4 items, $\alpha=.93 / .93$ for wave 1 / wave 2 e.g., "The demands of my work interfere with my home and family life" Negative work-family spillover Grzywacz & Marks, (2000); 4 items, $\alpha=.83 / .83$ for wave 1 / wave 2; e.g., "Has your job reduced the effort you can give to activities at home?" Work-family fit (time adequacy) (Van Horn, Bellis and Snyder, 2001); 9 items, e.g., "To what extent is there time to get enough sleep/rest?" $\alpha=.90 / .91$ for wave 1 / wave 2	2	WTC (T1): B= -.282, $p<.001$ Change in WTC T1-T2: B =-.465, $p<.001$ Participation in ROWE: B =-.220, $p<.001^*$ WTC (T1): B= -.148, $p<.001^*$ Change in WTC T1-T2: B =-.229, $p<.001$ Participation in ROWE: B =-.098, $p<.05^*$ WTC (T1): B= .514, $p<.001$ Change in WTC T1-T2: B =.733, $p<.001$ Participation in ROWE: B =.360, $p<.001$ *significance of ROWE Participation disappeared when controlling for worktime control	+
33	Moen, Kelly & Hill, 2011 (I)	775, US; 80%rr; age 32, highly educated white collar	Participation in ROWE (= Results Only Work Environment): yes (1) / no (0) T1: before implementation ROWE; T2: 6 months after implementation ROWE	Turnover intention 3 items, $\alpha=.905$; e.g., "I think a lot about leaving Best Buy"; used as outcome at T2/ predictor at T1 Actual turnover: Does employee quit job within 8 months following intervention? (registered data)	2	<i>Longitudinal:</i> B= -.314, $p<.01$; ROWE reports lower turnover intention at wave 2 <u>Turnover by wave 2:</u> HR(hazard ratio)=.545, $p<.05$: When interactions included: HR=.001, $p<.001$ ROWE reduces turnover	+
38	Kandolin & Huida, 1996 (I)	$rr_{T0}=76\%$ $rr_{T1}=54\%$ N(Int)=45 N(cont)=13; Midwives; FIN	Multi-intervention design; 3 goals: (1) Turn shift rotation clockwise – goal only met among some work-units (2) Plan shifts 6	Mental strain Categorized: rather or very strenuous vs. not	4	Strain during morning shift decreased from 27% to 11% ($p=.09$ - NS) Strain during evening shift decreased from 17% to 9% (NS)	0

			months ahead – <i>goal not met</i> (3) Increase employees' participation in shift planning = <i>only goal that was successfully accomplished</i>	Tiredness Categorized: rather or very tired vs. not		Tiredness during night shift decreased from 53% to 44% (p=.02)	+
				Mental stress Categorized: somewhat or much vs. not		Decreased from 27% to 15% (p=.07 - NS)	0
				<i>(All measures from Standard Shiftwork Index (Barton et al., 1992) or Occupational Stress Questionnaire (Elo et al., 1992))</i>			
40	Viitsalo, Kuosma, Laitinen & Härmä, 2008 (I)	84 male maintenance workers; FIN <u>Control:</u> N=22 <u>Forward rotation intervention:</u> N=40 <u>Flexible system:</u> N=22 T ₁ :5-6 months before intervention T ₂ : 7-8 months after intervention	<u>Control group:</u> Remained in backward rotating system <u>Intervention1:</u> change to rapid forward rotation; <u>Intervention2:</u> Flexible system: Workers were allowed some individual flexibility and control over their workhours in exchange for variability <u>Condition:</u> self-selected	Blood pressure Heart rate Diseases Diseases diagnosed by physician (self-report) Daytime sleepiness Epsworth Sleepiness Scale/Basic Nordic Sleep Questionnaire Sleep disturbances Epsworth Sleepiness Scale/Basic Nordic Sleep Questionnaire Falling asleep at work Epsworth Sleepiness Scale/Basic Nordic Sleep Questionnaire	4	Decreased p=.049 NS NS NS NS	+
41	Peters, den Dulk & van der Lippe, 2009 (CS)	807, NL, mixed gender, various occupations rr=29%	1 item: "1 = mostly someone else controls my working hours"; to 5 = "I mostly control my working hours"	Work-home interference 3 items (Geurts et al., 2005) α=.67, e.g., "How often does it happen that your work schedule makes it difficult for you to fulfill your domestic obligations?"	1, 2	r = .07, p<.01 b = -.04/-.05; p<.01	+
42	Grice, McGovern & Alexander, 2008 (L)	522 women, rr=71%, US	1 item: "How easy is it to change your working hours?" (measured: 6 months after childbirth)	Job spillover 2 items, e.g., "How often does your job or career interfere with your responsibilities at home (e.g. childcare, cooking, cleaning?)" (measured: 12 months after	2	B = NS	0

childbirth)							
43	Bohle, Willaby, Quinlan & McNamara, 2011 (CS)	179, AUSTRAL, call centre rr not indicated	2 items: (1) "I have sufficient control over the shifts that I work" (2) "It is easy to change shifts" ($\alpha = .81$)	Work-life conflict 7 items, + items from Bohle & Tilly (1998); $\alpha = .923$ Fatigue 1 item: "How often do you feel fatigued while working?" Psychological symptoms 12 items from General Health Questionnaire $\alpha = .902$	3	No significant relations retained in model	0 0 0
44	Skinner & Pocock, 2008 (CS)	887, AUSTRAL, 51% manager or professional, 40% rr.	2 items: (1) "you have a lot of freedom to decide when you do your work" (2) "your working times can be flexible to meet your needs" no α reported	Work life conflict 5 items, $\alpha = .81$ e.g., work restricts time with family and friends	2	B = -.21, $p < .01$	+
45	Golden, Veiga & Simsek, 2006 (CS)	454, US, telecommuter only, professional occupation; rr=36%	5 items (Pierce & Newstrom, 1983): (1) how much are you left on your own to define your own work schedule; (2) to what extent are you able to act independently of your supervisor in defining your work schedule; (3) to what extent are you able to define your work schedule independently of others; (4) to what extent can you exercise independent thought, judgement, and action in determining when you will work; (5) how much discretion can you exercise in	Work-life conflict 6 items, (Carlson et al., 2000), $\alpha = .90$; e.g.: "My work keeps me from my family activities more than I would like."	1, 2	r = .09, $p < .05$ B = ns	- 0

		defining your work schedule; $\alpha = .91$					
46	Nabe-Nielsen, Garde & Diderichsen; 2011 (I)	Baseline N = 309/ full data = 175 rr=81% Follow-up N = 287/ full data = 115 rr=73% All female nurses, DAN;	Intervention group had access to self-scheduling arrangement and were self responsible for every period's schedule, using a computer program	Stress 6 items (Kjellberg & Wadman, 2002); $\alpha=.85$ Energy 6 items (Kjellberg & Wadman, 2002); $\alpha=.81$ Work-family conflict 2 items, e.g., "Do you feel that your work drains so much of your energy that it has a negative effect on your private life?" Biomarkers associated with CVD	2	NS NS NS NS	0 0 0 0
47	Hornung, Glaser, Rousseau, Angerer & Weigl, 2011 (CS, L)	wave 1: 159 , 53%rr; wave 2: 142, 47.3% rr; Longitud sample: 91; Hospital physicians, GER	Flexibility idiosyncratic deals Had negotiated personalized working conditions deviating from applicable standards (1-5): - special working time flexibility - an individually customized work schedule - more influence over working hours 3 items, $\alpha1 = .81$, $\alpha2 = .85$ for wave 1 and 2 respectively	Work engagement 17 items (Shaufeli & Bakker, 2004); e.g., "At my job, I feel strong and vigorous"; $\alpha1=\alpha2=.93$ Work family conflict 5 items (Netemeyer et al., 1996), $\alpha1=.93$, $\alpha2=.89$ for waves 1 and 2; e.g., "the demands of my work interfere with my home and family life"	1, 3	T1: r = NS T2: r = NS SEM: $\beta=NS$ r [WTC(T1)-WE(T2)] = NS / r [WTC(T2)-WE(T1)] = NS T1: r = -.16, p<.05 T2: r = NS SEM: $\beta=-.24$, p<.05 r [WTC(T1)-WFC(T2)] = NS / r [WTC(T2)-WFC(T1)] = NS	0 0 0 0 0 0 0 0 0 0
48	Pryce, Albertsen & Nielsen, 2006 (I)	N= 91(control)/86 (intervention), healthworkers / nurses, 92% female; DAN	Intervention group had access to self-scheduling arrangement and were self responsible for every period's schedule using computer program	Work life balance 5 items, e.g., "Do you have the energy to be with your friends and family in your time off?" (no α indicated) Global self-rated health 1 item: "how do you rate your health in general?" Behavioral stress symptoms ⁽¹⁾ 4 items, $\alpha=.81$ (at t1)/.85 (at t2) Cognitive stress symptoms ⁽¹⁾ 4 items, $\alpha=.87/.91$ Somatic stress symptoms ⁽¹⁾ 4 items, $\alpha=.67/.58$ Vitality ⁽¹⁾ 4 items, $\alpha=.60/.63$	4	Improved more for intervention than control; p <.01 NS NS NS NS	+ 0 0 0 0

				Job-satisfaction 5 items, $\alpha=.58/.69$ <i>*measures marked with⁽¹⁾ are derived from Setterlind & Larson (1995)</i>		Improved more for intervention than control; $p < .01$	+
49	Pisljar, van der Lippe, den Dulk, 2011 (CS)	1597, 8 EU countries, 81% female, hospital employees; rr not indicated	1 item: "Does employee have the freedom to decide when to do his job?" (1-4)	Self rated health 1 item: describe own health; three categories: 1 (fair/poor), 2 (good) & 3 (excellent)	2	NS	0
50	Garde, Nabe-Nielsen & Aust, 2011 (I)	N(Total)=391 N(T1)=299 N(T2)=297 N(T1&2)=194 all female nurses, DAN	Successful intervention group had access to self-scheduling arrangement; used IT software to self-plan working time	Sleep - 7 items from KSQ; (no α indicated) - overall rate of sleep quality, 1 item: "How do you rate your overall quality of sleep?" 1-5	2	NS	0
51	Keeton, Fenner, Johnson & Hayward, 2007 (CS)	935 physicians, US, rr= 48%	2 items: "How much control do you have over.. (1) the total number of hours you work?" (2) when you work?" (no α indicated)	Work life balance 5 items, e.g., "feeling torn between demands from work and personal life" (no α indicated) Emotional resilience (From Maslach Burnout Inventory), e.g.: "I feel like I'm at the end of my rope" – number of items not indicated. (no α indicated)	2	$\beta = 0.28, p < .001$ $\beta = 0.32, p < .001$	+ +
52	Jang, Park & Zippay; 2011 (CS)	1.057, North-KOREA; rr86%; age 32	2 items: 1: I can determine my time schedules 2: I can determine my work schedules 1 – 5 (agree strongly); $\alpha=.84$	Job satisfaction 5 items from job descriptive index (Smith, Kendall & Hullin, 1969); $\alpha=.84$ e.g., "I'm satisfied with my job" Mental health 5 items from GHQ (Golberg & Williams, 1988) e.g., "I could not concentrate on whatever was happening around me"	1, 2	$r = .24, p < .01$ $B=.072, p < .10$ $r=.05, p < .01$ $B= NS$	+ 0
53	Galovan, Fackrell, Buswell, Jones, Hill & Carroll, 2010 (CS)	2.895, US(n=1860)/Singapore (n=1035)	1 item: "Overall, how much control would you say you have in scheduling your work hours?" 1-4	Work to family conflict 5 items, $\alpha=.84$ (U.S.) / .92 (Singapore); e.g., "How often have you not had enough time for your family because of your job?" (1-4) Depressive symptoms 7 items, $\alpha=.83/.92$;	1, 3	US: $r = -.17, p < .01$ $B=-.133, p < .01$ Singapore: $r = .10, p < .01$ $B=.068, p < .05$ US: $r = -.09, p < .01$ $B= NS$	0

				e.g., "How frequently have you had trouble feeling down?"		Singapore: r = .09, p<.01 B = .104, p<.01	-
				Job satisfaction 1 item: "All in all, how satisfied are you with your job?", 1-4		US: r = .18, p<.01 B = .109, p<.01 Singapore: r = .19, p<.01 B = .118, p<.05	+
54	Hill, Erickson, Holmes & Ferris, 2010 (CS)	24,436, 75 countries, rr.41%; employees at IBM	1 item: "How much flexibility (personal control) do you have in scheduling WHEN you do your work (scheduling the hours you work, the time of day, etc.)?" (1-5)	Work-life conflict 1 item: "How easy or difficult is it for you to manage the demands of your work and your personal/family life?" 1(easy)-5(difficult)	1, 2	r = -.307, p<.001 B = -.268, p<.001	+
55	Rothbard, Philips & Dumas, 2005 (CS)	460; US. 66% female; employees at university, mixed occupations; rr=30%	1 item: "how much are you able to use flexible time during the work week (e.g., flexibility in starting and stopping time, scheduling lunch) now."	Job satisfaction 3 items (Hackman & Oldham, 1980; Ironson et al., 1989), α = .88, e.g.: "In general, I am satisfied with my job" Organizational commitment 8 items (Allen & Meyer, 1991), α = .81, e.g.: "I would be very happy to spend the rest of my career with this organization"	1, 2	r = .13, p<.05 B = NS r = .09, p \approx .05 B = -.02, NS model with main effects + control variables	0
56	Russo & Waters, 2006 (CS)	169 AUSTRALIA, legal industry, 76% manager/professional; rr not indicated	"Can you change your work schedules or shifts on a weekly basis." Categorical: yes / no	Work family conflict 16 items (Bohen & Viveros-Long, 1981), α = .73, e.g. "I worry whether I should work less and spend more time with my children." Work drive 7 items (Spence & Robbins, 1992); 1-5 scale, α = 0.85, e.g. "I seem to have an inner compulsion to work hard." Work enjoyment 10 items (Spence & Robbins, 1992), 1-5 scale, α = 0.88, e.g. "My job is more like fun than work"	1, 4	r = NS F = 1.09, NS r = NS	0
57	Lemasters, Atterbury, Booth-Jones et al., 1998 (CS)	490 carpenters, US; rr=83%; 97.8% male;	1 item: "How much control do you have over your work schedule?"	Work related musculoskeletal disorders Symptoms in several parts of the body	2	OR range from 1.1 to 2.9; (M _{OR} = 2.0)	+

			1=no or moderate control; 0 = otherwise				
58	Hammer, Allen & Grigsby, 1997 (CS)	399 Bank employees (mixed positions) & their employed partners (Ntotal=798); rr = 50%	1 item: "How much flexibility do you have in your work schedule to handle family/personal responsibilities?" 1 (no flexibility) - 4 (a lot of flexibility)	Work family conflict Goff et al. (1990); 16 items, $\alpha=.88$	1, 2	Females: $r = -.25$, $p < .01$ $B = -.24$, $p < .001$ Males: $r = -.17$, $p < .01$ $B = -.16$, $p < .001$	+
59	Brooks & Swailes, 2002 (CS)	2987 nurses; 92% female, U.K.; rr=64%	1 item: "Have you any influence over the shift pattern that you work?" 1 = yes, 0 = no	Professional commitment 4 items; $\alpha=.72$, 1-5; Job change intentions 1 item: "are you seeking work or a change of job at the moment?"	1, 2, 4	$r = .07$, $p < .01$ ANOVA: nurses with influence report higher commitment (M=13.25 vs. 12.80; $p < .01$) $B = NS$	+
60	Olsen & Dahl, 2010 (CS)	2561; NOR	Categorization: 1 item: <i>Worktime control:</i> "Flexible, regulated flexible schedule or complete flexibility in work schedule" <i>No worktime control:</i> "No flexibility, have to meet at work at a given time or when called for"	Sickness absence 1 item: has respondent been absent for a two week period or longer during the past 12 months? Yes/no – self-reported Work-family balance 1 item "is it difficult to combine your job with the private life or family life you want to live?" yes, to some extent / yes, to a great extent = 1; other = 0	2, 5	<i>Women:</i> $\chi^2 = NS$ $b = NS$ <i>Men:</i> $\chi^2 = NS$ $b = NS$ <i>Women:</i> $\chi^2: p < .05$ M(flex)=19.5% M(no flex)=12.7% $b = NS$ <i>Men:</i> $\chi^2: p < .01$ M(flex)=21.4% M(no flex)=12.5% $b = NS$	0 0 - 0 -
61	Barton, 1995 (CS)	1082 nurses and midwives; U.K; rr, gender and sample sizes of subgroups not reported	Three shift types compared: (1) <i>Regular:</i> Fixed roster repeated when the cycle of shifts finishes, even if occasional variations occur to meet special requests (2) <i>Irregular:</i> Duty roster does not cycle or	Psychological ill health Cardiovascular symptoms	4	<i>Permanent night:</i> M(flex)=11.15 M(regular)=10.72 $p = NS$ <i>Internal rotation:</i> M(flex)=12.54 M(irregul)=13.38 $p < .05$ <i>Permanent night:</i> M(flex)=9.51 M(reguarl)=10.04 $p = NS$ <i>Internal rotation:</i>	0 + 0 0

<p>repeat in any regular manner and individual preferences are not taken into account</p> <p>(3) <i>Flexible:</i></p> <p>The individuals concerned are consulted about their preferred duty hours before the duty roster is drawn up</p>		M(flex)=10.12 M(irregul)=10.33 p = NS	
	Digestive symptoms	<i>Permanent night:</i> M(flex)=13.42 M(regular)=13.15 p = NS	0
		<i>Internal rotation:</i> M(flex)=14.09 M(irregul)=14.68 p = NS	0
	Chronic fatigue	<i>Permanent night:</i> M(flex)=22.33 M(regular)=23.47 p = NS	0
		<i>Internal rotation:</i> M(flex)=24.90 M(irregul)=26.15 p <.05	+
	Sleep Quality	<i>Permanent night:</i> M(flex): range 13.38 - 16.00 M(regular): range 14.82 - 16.30 p = NS	0
		<i>Internal rotation:</i> M(flex): range 12.04 – 19.57 M(irregul): range 12.51 – 20.82 p < .01	+
	Social/domestic disruption	<i>Permanent night:</i> M(flex)=6.94 M(regular)=7.39 p = NS	0
		<i>Internal rotation:</i> M(flex)=8.49 M(irregul)=8.98 p <.01	+
	Job dissatisfaction	<i>Permanent night:</i> M(flex)=15.13 M(regular)=16.99 p <.05	+
	<i>All outcomes measured by the Standard Shiftwork Index (Barton et al., 1992); no α reported</i>	<i>Internal rotation:</i> M(flex)=16.41 M(irregul)=17.59 p < .01	+

Notes.

*1: Populations are mixed gender, mixed population, unless otherwise noted; “rr” indicates the sample’s response rates

*2: ‘+’ indicates a favourable association, ‘-’ indicates an adverse association, ‘0’ indicates no association

*3: Design: CS = cross sectional / L = Longitudinal / I = Intervention

*4: Analysis: 1 = correlation, 2 = regression, 3 = SEM, 4 = analysis of variance, 5 = chi-square test

Table X2

Multidimensional Worktime Control and its Associations

Reference	Sample* ¹	Design/data-collection		Analysis reported	Outcome	Remarks
		WTC	DV		Association	
16 Wittmer & Martin, 2011 (CS)	610 part-timers, US., retail food chain, 21%rr N(fixed)=263 N(flex)=337	7 items, 1-5, $\alpha=.92$; e.g., "How much control do you have over . . . (1) When you take days off from work? (2) When you take a few hours off of work? (3) When you begin and end work each day? (4) The particular days of the week you work? (5) The number of hours you work each week? (6) Scheduling your work hours? (7) Your work schedule in general?	Overall job satisfaction 3 items (Cammann et al., 1983), $\alpha=.85$; e.g., "All in all, I am satisfied with my job." (1-5) Affective organizational commitment 3 items (Martin & Peterson, 1987), $\alpha=.87$; e.g., "I am proud to tell others that I am part of my employer's organization" (1-5)	1, 2	Employees with fixed/flexible obligations outside job: $r=.20/.29$, both $p<.05$ $\beta = NS$ $r = .19/.16$, $p<.05$ $\beta = .09$, $p<.05$	0 +
19 Elovainio, van den Bos, Linna et al., 2005 (L)	31.400, mixed gender, FIN, various occupations; 77% female	6 items, $\alpha=.82$; (1) the starting and ending times of a workday (2) the taking of breaks during the workday (3) handling private matters during the workday (4) the scheduling of workshifts (5) the scheduling of vacations and paid days off (6) the taking of unpaid leave Mean score	Sickness absence Number of days sick leave; from registered data	1, 2	$r = -.08$, $p<.001$ Low control was associated with higher chance of sickness absence: OR: 1.11 for men, 1.13 for women	+ Sample from the Finnish 10-town study
20 Ala-Mursula, Vahtera, Pentti, et al., 2004 (L)	FI, 4.218 rr(baseline)=67% rr(follow-up)=81%	6 items, $\alpha = .82$ Control over: beginning and end of a workday, breaks and deal with private matters during workday, shifts, paid days off and vacations, unpaid leave	Self rated health 1 item: overall rating of health; dichotomized: good/poor Psychological distress 12 items (GHQ); dichotomized: < 4 vs. ≥ 4 symptoms Sickness absence Frequencies of medically certified sickness absence	2	OR[low vs. high WTC] = 1.86 (women) = 0.93 (men) No p -value reported OR[low vs. high WTC] = 1.40 (women) = 0.92 (men) No p -value reported OR[low vs. high WTC] = 1.51 (women) = 1.28 (men)	+ + +

				periods (> 3 days) during 2001		No p-value reported		
21	Ala-Mursula, Vahtera, Kivimäki et al., 2002 (L)	6442, FI, 67%rr	6 items, $\alpha=.82$; (1) the starting and ending times of a workday (2) the taking of breaks during the workday (3) handling private matters during the workday (4) the scheduling of workshifts (5) the scheduling of vacations and paid days off (6) the taking of unpaid leave; Categorized into quartiles	Self rated health 1 item: overall rating of health; dichotomized: good/poor Psychological distress 12 items (GHQ); dichotomized: < 4 vs. \geq 4 symptoms Sickness absence number of sickness absence records during 1997-1998 (registered data)	2	OR[low vs. high WTC] = 2.20 (women) = 1.32 (men) OR[low vs. high WTC] = 1.96 (women) = 1.14 (men) OR[low vs. high WTC] = 1.19 (women) = 1.10 (men)	+	Sample from the Finnish 10-town study
24	Vahtera, Laine, Virtanen et al., 2010 (CS, L)	30.700 FI, 67%rr, 78% female	7 items, $\alpha=.84$; 1. total length of a working day, 2. starting and ending times of a working day, 3. breaks during the working day, 4. taking care of private matters during the working day, 5. scheduling of work shifts, 6. scheduling of vacations and paid days off, 7. unpaid leave <i>Assessed on both individual and unit-level</i>	Use of disability pension Collected from registered data during 4.4 years follow-up	2	Hazard ratio =.87 (self-assessed WTC) =.76 (unit-assessed WTC)	+	Sample from the Finnish 10-town study
30	Shultz, Wang, Crimmins & Fisher, 2010 (CS)	15.986, 15 different countries, EU; rr not indicated	3 items: yes/no (1) You can take your break when you wish (2) You are free to decide when to take holidays or days off (3) You have a fixed starting and finished time every day (reverse scored); $\alpha=.69$	Health/stress 1 item, yes/no: Does work affect health by impacting stress?	1, 2	r = NS B = NS	0	Data from Second European Survey on Working Conditions
31	Shultz, Wang & Olson, 2010 (CS)	15.692, 15 EU countries	3 items, $\alpha=.69$; yes or no: (1) you can take your break when you wish; (2) you are free to decide when to take holidays or days off; and (3) you have a fixed start and finish time every day (reverse-scored)	Health/stress 1 item: Does work affect health by impacting stress? Yes (=1) vs. no (=0)	2	B = NS	0	Data from Second European Survey on Working Conditions

finish times of the shifts you work (3) the length of the shifts that you work (4) the days of the week on which you work; Response: 1-5, $\alpha=.86$	muscoskeletal pain; $\alpha=.83$ Psychological health 12 items, General Health Questionnaire; $\alpha=.88$ Chronic fatigue 3 items from Standard Shiftwork Index (Barton et al., 1992); $\alpha=.84$	 r= NS B= NS r=-.14, p<.05 B= NS	 0 0
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Notes.

- *1: Populations are mixed gender, mixed population, unless otherwise noted; “rr” indicates the sample’s response rates
- *2: ‘+’ indicates a favourable association, ‘-’ indicates an adverse association, ‘0’ indicates no association
- *3: Design: CS = cross sectional / L = Longitudinal / I = Intervention
- *4: Analysis: 1 = correlation, 2 = regression, 3 = SEM, 4 = analysis of variance

Table X3

Flexitime and its Associations

Reference	Sample* ¹	Design/data-collection			Outcome	Remarks		
		WTC	DV	Analysis reported				
22	Ala-Mursula, Vahtera, Linna et al., 2005 (CS, L)	16.139, FIN, 67%rr	2 items, assessed in 2000/2001: -"influence over the length of their workday -influence over starting and ending times of the workday" (1-5); categorized into 4 groups	Sickness absence (medically certified, company registered) > 3 days absent, measured during the years after questionnaire until end 2003	2	OR's: no vs. total control =1.26 (Men) =1.29 (Women)	+	Data from 10-town study
23	Ala-Mursula, Vahtera, Kouvonen, Väänänen et al., 2006(L)	25.703, FIN, 80% female, 67% rr	2 items, assessed in 2000/2001: -"influence over the length of their workday -influence over starting and ending times of the workday" (1-5) categorized into 4 quartiles	Sickness absence Measured during the years after questionnaire until end 2003 (company registered) a) ≤ 3 days absent b) > 3 days absent	2	OR's: no vs. total control Men: a= 1.28[≤ 3 days] b= 1.38[> 3 days] Women: a=1.11[≤ 3 days] b= 1.38[> 3 days]	+	Data from 10-town study
67	Hornung, Rousseau & Glaser, 2008 (CS)	887 tax administrators, Germany, rr=59%	2 items, scale 1-5, α=.82; does employee have: "Flexibility in starting and ending the workday / Individually customized work schedule"	Affective commitment 5 items, α= .75 (Penley & Gould, 1988); e.g.: "I am dedicated to this organization" Work family conflict 5 items, α= .92; e.g.: "The demands of my work interfere with my home and family life"	1, 3	r = NS β= NS r = NS β= -.12, p<.01	0 +	
68	Takahashi, Iwasaki, Sasaki, et al., 2011 (CS)	4280; mixed occupation, Japan rr=93%	2 item: "how much are participants able to influence the length of a workday and the starting and ending times of a workday?" (1-5); 3 categories: high / moderate / low leave control	Recovery from fatigue 1 item: "How often do you carry over fatigue from work and non-work following a night's sleep?" (0-3) Insomnia 1 item: "How often the participants experienced insomnia during the past one month?" (0-3) Daytime sleepiness 8 items (Epworth Sleepiness Scale); e.g., "likelihood of dozing off in daily life situations" (0-3) Depressive	4	Different models assessed: more or less control variables included All p-values <.001 Higher recovery associated with WTC p-values differ: .108 - .049 -> marginally/not significant Flexitime associated with lower insomnia p differ: .029 to .051 -> significant Flexitime associated with less sleepiness All p-values	0 + 0 + +	

				symptoms 20 items (CES-D), 1-4		≤.001 Flexitime associated with lower symptoms	
69	Schieman & Young, 2010 (CS)	1.100, mixed occupation, U.S., rr=71%	1 question: "Who usually decides when you start and finish work each day at your main job? Is it someone else, or can you decide within certain limits, or are you entirely free to decide when you start and finish work?" (1-3)	Work family conflict 4 items, α=.85; e.g., "How often have you not had enough time for your family or other important people in your life because of your job?"	2	B = comparison full vs. no schedule control: B-values range from -.15 to -.33; p-values: <.05 to <.001	+
70	Grzywacz, Carlson, Shulkin, 2008 (CS)	85.936, US No rr indicated	Formal flexible arrangement: Flexitime: Categorical; uses this option? Yes/no	Stress and burnout 7 items (Civian et al., 2008), α=.72; e.g., "feeling unable to get everything done"	2	B's range from -0.59 to -0.26; both, p<.001	+
71	Lapierre & Allen, 2006 (CS)	230, highly educated -> all university alumni Rr=49-58%	2 items: is flexitime provided? (Yes/no) 2: if yes, do you use it? (Yes/no)	Affective wellbeing 13 items (Caplan, Cobb, French .. 1980), α=.83; e.g., "How often do you feel nervous?" Physical wellbeing 13 items (PSI, Spector & Jex's, 1998); e.g., "How frequently experienced these symptoms during past 6 months" Time based WIF 3 items (Carlson et al., 2000); α =.79-.87 Strain based WIF 3 items (Carlson et al., 2000); α =.79-.87	2	B = NS B = NS B = NS	0 Highly educated sample 0 0
72	Russell, O'Connell & McGinnity, 2009 (CS)	5.198, IRE, 46.5%rr	2 items (yes/no): "Is the work arrangement available at the workplace?" "Is the person personally involved in, or covered by the practice", the practice/ arrangement = flexible hours or flexitime	Work-life conflict 4 items; e.g., "how often are you too tired to enjoy things outside work"	2	Base model: B= NS	0
73	Carlson, Grzywacz & Kacmar, 2010 (CS)	607, US, 52.4%rr, all fulltime	1 item, choose between: "work 40 or more hours per week throughout the year with little	Work to family conflict 9 items from Carlson et al. (2000), α=.91; e.g.: "My work keeps me from my family	1, 2	r = -.17, p<.01 B = -.172, p<.01	+

			flexibility over when you begin and end work” vs. “you are allowed to make changes in the time you begin and end work around a minimum set of core work hours” -> 2 groups	activities more than I would like.” Work to family enrichment 9 items, Carlson (2006) $\alpha=.94$; e.g.: “My involvement in my work helps me to acquire skills and this helps me to be a better family member.” Job satisfaction 3 items (Cammann et al., 1979), $\alpha=.93$; e.g.: “All in all, I am satisfied with the job.” Job performance 5 items, Williams and Anderson (1991), $\alpha=.82$; e.g.: “On average, how often do you fulfill responsibilities specified in your job description”		$r=.11, p<.01$ $B = 0.102, p<.01$	+
						$r=.12, p<.01$ $B = 0.086, p<.05$	+
						$r = NS$ $B= NS$	0
74	Geurts, Beckers, Taris, et al., 2009 (CS)	2.370, NL, 46%rr	1 item: To what extent does employee have control over when to start and finish their working days? “very low control” (1) - “very high control” (5)	Work family interference 1 item: “Do you let pass or neglect family activities because of your job?” 1-4	1, 2	$r = NS$ $B = NS$	0
75	Wajcman, Rose, Brown & Bittman, 2010 (CS)	653, AUSTRALIA rr=54%	1 item: Control over starting/ ending times; dichotomized: no vs. some control	Work-family spillover: 2 items; e.g., “because of my work responsibilities I have missed out on home/family activities that I would have liked to have taken part in” (no α indicated)	2	$B= NS$	0
76	Mennino, Rubin, Brayfield, 2005 (CS)	2.334 US rr not indicated	1 item: is flexitime available: yes / no	Job to home spillover 5 items, $\alpha= .86$, sum score; e.g., “In the past three months, how often have you not had enough time for yourself because of your job?” (1-5) Job satisfaction 1 item, rating 1-4	1, 2	$r = -.07, p <.01$ $B = NS$	0 Data from the 1997 National Study of the Changing Workforce
77	Scandura & Lankau, 1997 (CS)	N=160 managers; U.S., rr=39.7%	1 item: “Does your organization	Organizational commitment Occupational	4	$r = .12, p <.01$ $B = not assessed$ $p<.05$; Flexible hours: $M=60.33$	+

offer flexible hours?" yes(1)/no(0)	Commitment Questionnaire (Mowday et al., 1979); 15 items, $\alpha=.90$ Job satisfaction Minnesota Satisfaction Questionnaire (Weiss et al., 1967); 20 items, $\alpha=.90$	No flexible hours: $M=55.58$ $p<.05$; Flexible hours: $M=82.63$ No flexible hours: $M=77.38$	+
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Notes.

- *1: Populations are mixed gender, mixed population, unless otherwise noted; "rr" indicates the sample's response rates
- *2: '+' indicates a favourable association, '-' indicates an adverse association, '0' indicates no association
- *3: Design: CS = cross sectional / L = Longitudinal / I = Intervention
- *4: Analysis: 1 = correlation, 2 = regression, 3 = SEM, 4 = analysis of variance

Table X4

Leave Control and its Associations

Reference	Sample* ¹	Design/data-collection		Analysis reported	Outcome Association	Remarks
		WTC	DV			
²² Ala-Mursula, Vahtera, Linna et al., 2005 (CS, L)	16.139, FIN, 67%rr	2 items, $\alpha=0.67$: 1: Control over the scheduling of vacations and paid days off 2: Control over taking unpaid leave	Sickness absence (medically certified, company registered) > 3 days absent, measured during the years after questionnaire until end 2003	2	OR's: no vs. total control =1.26 (Men) =1.23 (Women)	+
⁴² Grice, McGovern & Alexander, 2008 (L)	522 women, 71%rr, US	1 item: How hard to take time off? 1-4 <i>measured 6 months after childbirth</i>	Job spillover 2 items; e.g., "How often does your job or career interfere with your responsibilities at home (e.g. childcare, cooking, cleaning?)" <i>measured 12 months after childbirth</i> (no α indicated)	2	$\beta = -1.08$, $p < .01$ (not at all hard vs. very hard)	+
⁶⁸ Takahashi, Iwasaki, Sasaki et al., 2011 (CS)	4280; mixed occupation, Japan rr=93%	2 items: control over scheduling of vacations and paid days off and control over unpaid leave (1-5); 3 categories: high / moderate / low leave control	Recovery from fatigue 1 item: "How often do you carry over fatigue from work and non-work following a night's sleep?" (0-3) Insomnia 1 item: "How often the participants experienced insomnia during the past one month?" (0-3) Daytime sleepiness 8 items (Epworth Sleepiness Scale); e.g., "likelihood of dozing off in daily life situations" (0-3) Depressive symptoms 20 items (CES-D), 1-4	4	All p -values $< .001$ high leavecontrol associated with higher recovery All p -values $\leq .001$ high leavecontrol associated with lower insomnia p -values range from $< .001$ to $.037$ -> high leavecontrol associated with lower sleepiness All p -values $< .001$ High leavecontrol associated with lower depressive symptoms	+
⁷⁴ Geurts, Beckers, Taris, et al., 2009 (CS)	2.370, NL, 46%rr	1 item: To what extent does employee have control over when to take days off and vacations? 1 - 5	Work family interference 1 item: "Do you let pass or neglect family activities because of your job?" 1-4	1, 2	$r = -.16$, $p < .01$ $\beta = -0.12$, $p < .001$	+
⁷⁸ Jansen, Kant,	6.947, NL, rr=45%	1 item: does	Work-home	2	OR: ability to	

*4: Analysis: 1 = correlation, 2 = regression, 3 = SEM, 4 = analysis of variance

				(4) arm/hand diagnoses		Not reported	
82	McNall, Masuda, Nicklin, 2010 (CS)	220, International, 12.9% rr	Flextime / compressed workweek Is flextime available? (yes [1] / no [0]) Is compressed workweek option available? (yes [1] / no [0]) Sum score: 0 to 2	Work family enrichment: Carlson, Kacmar .. (2006): 9 items, average score, $\alpha=.94$ e.g. "My involvement in work helps me to understand different viewpoints and this helps me be a better family member" Job satisfaction: 3 items from Spector et al. (2004), $\alpha=.80$ e.g. "In general, I like my work" Turnover intentions: 3 items from Colarelli et al. (1984), $\alpha=.80$ e.g. "I frequently think about quitting my job"	1, 2	$r=.32, p<.01$ $\beta = .36, p <.01$	+ Flex+compress
						$r = .29, p<.01$ $\beta = .31, p <.01,$	+
						$r = -.20, p<.05$ $\beta = -.22, p <.01$	+

Notes.

- *1: Populations are mixed gender, mixed population, unless otherwise noted; "rr" indicates the sample's response rates
- *2: '+' indicates a favourable association, '-' indicates an adverse association, '0' indicates no association
- *3: Design: CS = cross sectional / L = Longitudinal / I = Intervention
- *4: Analysis: 1 = correlation, 2 = regression, 3 = SEM, 4 = analysis of variance