European Journal of Public Health, Vol. 32, No. 3, 398–401

https://doi.org/10.1093/eurpub/ckac028 Advance Access published on 31 March 2022

Is work–life interference a risk factor for sickness absence? A longitudinal study of the Swedish working population

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Background: While there is increasing literature on the health effects of work–life interference, few studies have investigated the relationship between a direct measure of work–life interference and objective sickness absence measures. The aim of this study is to investigate whether work–life interference is a risk factor for subsequent long-term sickness absence (LTSA). **Methods:** Data were derived from the Swedish Longitudinal Occupational Survey of Health 2010, 2012, 2014 and 2016. Data were linked to register data on LTSA (having at least one continuous period of medically certified sick leave exceeding 14 days) the following 2 years after each data collection wave. We applied generalized estimating equations, odds ratios (ORs) and 95% confidence intervals (CIs). The sample included 15 244 individuals (43.1% men and 56.9% women). Nearly a fifth of the sample (18.7%, $n = 1110$) started at least one period of LTSA at any point between 2010 and 2018. **Results:** Work–life interference was found to be a risk factor for subsequent LTSA (OR = 1.55; 95% CI = 1.44–1.67) even when adjusting for relevant factors including general health (OR = 1.39; 95% CI = 1.29–1.51). We found no significant moderating effect of gender. **Conclusion:** The results of this study indicate that work–life interference is a risk factor for subsequent LTSA for working men and women in Sweden.

Introduction

Work–life interference is the extent to which individuals' working life interfere and collide with their private life or vice versa.[1] The concept of interference builds on role stress theory in recognizing the multiple burdens of different social roles and is recognized to impact individuals' health. Interference is frequently analysed in terms of work-to-private life (WLI) or private life-to-work (LWI) interference.[1,2] Generally, individuals tend to report higher levels of WLI than LWI.[2,3] Also, WLI seem to have a stronger relationship to poor health.[4,5] This article, therefore, focuses on WLI. A range of studies suggests WLI be a predictor for poor health[6–9] and sickness absence.[10] However, the vast majority of the existing literature uses subjective measures of health rather than objective measures[11] or conceptualizes WLI by different proxies, such as the number of children.[12] In response to these shortcomings in previous literature, the present study will apply register-based data on long-term sickness absence (LTSA); that is, medically certified sick leave exceeding 14 days from the Swedish Social Insurance Register. Therefore, this study makes an important contribution to understanding the aetiology of health in relation to WLI.

A few studies have explored WLI in relation to sickness absence, of which two apply objective measures. More than a decade ago, Väänänen *et al.*[13] and a few years later Lidwall *et al.*[14] found a positive association between WLI and objectively measured sickness absence. The study of Väänänen *et al.*[13] found that only severe negative work–family spillover was associated with a higher sickness absence rate. Since then, only a few studies have further explored the relationship between WLI and sickness absence.[10] A systematic review found eight studies of WLI and subsequent sickness absence between 2005 and 2015.[10] This review[10] presents a moderate relationship between WLI and subsequent sickness absence. With a few exceptions,[14] of the studies included in this review most lacked information about the length of sickness absence and whether it is subjectively or objectively measured.

Possible gender differences in the association between WLI and sickness absence merit further attention. During several decades, the organization of work and private life has changed.[15,16] Female labour participation has increased, resulting in less time for women to do the unpaid work carried out at home[16] and probably also increasing levels of WLI. At the same time, men have become more involved in child care[16] and, albeit to a smaller degree, housework.[16,17] Additionally, after a period of declining numbers of LTSA during the last decade, LTSA has increased in the Swedish working population, especially among women.[18,19] In contrast, one Swedish study showed that Swedish men with high WLI have higher odds of self-reported sickness absence up to 8 days but not women.[20]

Although these previous contributions are important, additional studies are justified for three reasons. First, most previous studies have applied subjectively measured health outcomes. Secondly, we find no studies on WLI and sickness absence conducted after 2015, although as mentioned above, changes have occurred regarding both the labour market and LTSA. Lastly, most studies conducted apply two or three time points at best, and more longitudinal studies are needed to understand the aetiology of health burden as a result of interference over time,[21] especially as longitudinal studies indicate causal, reversed causal and reciprocal effects between WLI and ill health.[6,7,22,23] With this study, we aim to advance on current knowledge by exploring whether WLI is a risk factor for subsequent, objectively measured LTSA among working men and women in

Sweden using a longitudinal dataset. Since gender differences exist in LTSA and WLI[9,18] we additionally assess gender as a moderator between WLI and subsequent LTSA.

Methods

Study population

Data were derived from the Swedish Longitudinal Occupational Survey of Health (SLOSH) study, a panel study based on a representative sample of the Swedish working population. The data collection started in 2006 with a follow-up of the participants in the Swedish Work Environment Surveys (SWES) from 2003 (age range 16–65). New waves of SWES have been added over time, and today SLOSH comprises all SWES participants from 2003 to 2011 ($n = 40\,877$). Data are collected every second year by means of a postal questionnaire in two versions; one for those in paid work and one for those having left work or working <30%. A detailed description of the study design and population of SLOSH can be found elsewhere.[24] The instrument to measure WLI was introduced in 2010, which is why 2010 composed wave 1 in this study. Here, the analytical sample includes individuals who answered at least twice the questionnaire for paid work between 2010 and 2016. Response rates vary between 57% in 2010 and 51% in 2016. We excluded participants who stated that they worked <30 h at all waves ($n = 35$ respondents) and those who had a period of LTSA registered within 3 years before they first participated in SLOSH ($n = 801$ respondents). The final sample reached 15 244 individuals, of whom 43% were men and 57% were women. The mean age in 2010 for the entire sample was 46.7 (SD 9.79) years. Also, 19% ($n = 1110$) started at least one period of LTSA at any point between 2010 and 2018 after answering the questionnaire (44% men and 56% women). The sample was analysed in relation to LTSA in four consecutive 2-year follow-up periods between 2010 and 2018. The proportions of respondents across exposure, covariates and outcome for each year are presented in table 1.

Ethical approval for the SLOSH data collection was obtained from the Regional Research Ethics Board in Stockholm (dnr: 2010/0145-32; 2012/373-31/5, 2013/2173-32; 2015/2187-32) and for the present study from the Swedish Ethical Review Authority (Ref: 2019-00972).

Outcome variable

SLOSH data were linked to register-based data for LTSA collected from the Social Insurance Analysis Micro Database (MiDAS) containing sick leave data from 1994 and onwards. The last entry point in LTSA in the current study was in November 2018. In Sweden, at the time of data collection, the first 14 days of sick leave were paid by the employer. From day 15, individuals received compensation from compulsory sickness insurance. Here, LTSA was defined as having at least one continuous period of medically certified sick leave exceeding 14 days. The LTSA variable is constructed as a dummy variable for each 2 years following SLOSH, where (1) represent the existence of LTSA and (0) no LTSA, i.e. LTSA for wave 1 compose the time between wave 1 and wave 2.

Exposure variable

WLI was measured by four items asking the respondent if he or she felt too tired after work to do the things he or she normally do; his or her private life was hampered due to work; their own needs was put aside due to work; and lastly, whether his or her private life suffer due to work.[25] Answers on a 5-point Likert scale ranged from not at all to almost always. Cronbach's Alpha for WLI across all waves varied between 0.89 and 0.91. An additive mean including the four items for each wave was calculated. Following Leineweber *et al.*,[26] WLI was then dichotomized with a cut of point 3.5 for each wave separately. In the dichotomization, high levels of WLI were set as 1 and low levels as 0.

Covariates include age, socioeconomic position (SEP; i.e. manual workers, lower non-manual worker and higher non-manual worker), having a managing position (yes/no), having a partner (yes/no), having children living at home (yes/no) and self-reported general health. These variables were found important in the study of Lidwall *et al.*[14] Self-reported general health were answered on a 5-point Likert scale from very god (1) to very bad (5) and dichotomized to (1) poor health values 4 and 5 and (0) good health include values 1–3.

Statistical analysis

First descriptive statistics were used to determine the proportion in the sample with high WLI, LTSA and distribution across included covariance variables, see table 1.

To identify the risk of LTSA as a result of WLI, generalized estimating equations (GEEs) were used.[27] GEE is adequate when modelling longitudinal data wherein the repeatedly measured outcome variable is binary and take into account correlations within each individual due to measurements over time.[26] The working correlation structure for the GEE were set to auto-regressive (AR1).[28] To fit the best models, the lowest Quasi Likelihood under Independence

Table 1 Proportions (%) of individuals that have the characteristics of each of the included study variables as well as mean age for each year

	Wave 1 2010 ($n = 6786$)[a]	Wave 2 2012 ($n = 6182$)[a]	Wave 3 2014 ($n = 12\,079$)[a]	Wave 4 2016 ($n = 11\,606$)[a]
LTSA[b]	5.0	4.7	10.5[c]	9.1[c]
High WLI[d]	24.4	19.4	24.2	23.9
Share of women	56.5	56.4	57.4	57.5
Children at home	53.1	48.2	46.5	42.5
Partner	79.6	79.3	79.4	79.4
Socioeconomic position				
Manual workers	31.0	31.6	29.4	28.4
Lower non-manual workers	46.2	46.6	47.8	47.5
Higher non-manual workers	22.9	21.8	22.8	24.2
Having a managing position	35.4	31.4	34.4	33.5
Age (mean)	50.8	52.3	52.7	54.6
Poor health	19.1	19.7	19.1	20.1

a: The cohort was extended over time which explains the increase in *n* over.
b: LTSA, long-term sickness absence is measured for the following 2 years from respective wave, i.e. LTSA for wave 1 compose the time between wave 1 and wave 2, 2010 and 2012.
c: Between 2012 and 2014, there was a general increase in LTSA in Sweden which is also reflected in the data.
d: Work–life interference.

Table 2 Generalized estimating equation for the impact of high conflict on subsequent long-term sickness absence (LTSA)

	M1		M2		M3		M4	
	OR[a]	CI[b] (95%)	OR	CI (95%)	OR	CI (95%)	OR	CI (95%)
High WLI[c]	1.55	1.44–1.67	1.49	1.39–1.61	1.39	1.29–1.51	1.20	0.98–1.48
Women (ref. men)			1.82	1.69–1.97	1.93	1.79–2.09	1.93	1.78–2.09
Having children (ref. no children)					0.98	0.90–1.07	0.98	0.90–1.07
Partner (ref. no partner)					1.01	0.92–1.11	1.01	0.92–1.11
Lower non-manual workers (ref. higher non-manual)					1.37	1.24–1.53	1.37	1.24–1.53
Manual workers (ref. higher non-manual)					2.15	1.92–2.41	2.15	1.92–2.41
Managing position (ref. employee position)					0.87	0.80–0.95	0.87	0.80–0.95
Poor health (ref good health)					1.70	1.56–1.85	1.70	1.56–1.85
Age					1.02	1.01–1.02	1.02	1.01–1.02
Wave	1.03	1.00–1.06	1.03	1.00–1.06	1.05	1.02–1.09	1.04	1.00–1.08
Wave*WLI[c]							1.05	0.98–1.13
QIC[d]	26 163.90		25 865.78		23 146.77		23 146.84	

a: Odds ratio.
b: Confidence interval.
c: Work–life interference.
d: Independence model criterion.

model criterion (QIC) was applied. The GEE was fitted according to the following function[27]:

$$logit(\mu_{ij}) = \beta_0 + \beta_1 \times \text{WLI} + \beta_2 \times \text{Wave}$$

In function 1, β_0, β_1 and β_2 are the regression coefficient parameters for intercept, WLI (high levels = 1 and low levels = 0) and waves. In Model 1 (M1), WLI is presented adjusted for wave. Next, in Model 2 (M2), we additionally adjusted for gender, and in Model 3 (M3), we adjusted for the covariates (partner, children, SEP, managing position, health and age). In a further step, we explored whether the role of experienced WLI for future LTSA changes across waves by adding an interaction term (wave*WLI) (M4).

Because gender is important for LTSA as well as WLI, gender was tested as a moderator. In sensitivity analyses, we run analyses for men and women separately for M3 and M4. All GEE models are presented as odds ratios (ORs) and with 95% confidence intervals (CIs). Analyses were conducted with IBM SPSS version 25.

Results

Descriptive results (table 1) show that the proportion of participants with a registered LTSA increased in the later waves compared to the first two waves. This increase is reflected in the general population in Sweden where an increase in LTSA occurred during the same period. The proportion of respondents reporting high WLI, poor general health, having a partner, and SEP is fairly stable across the studied period. The proportion of respondents living with children at home decreases across the studied period, which is most probably explained by respondents getting older, and thus their children growing older and finally moving out.

In table 2 (M1), the unadjusted result of the GEE shows that those who experience high WLI have higher odds of subsequent LTSA (OR = 1.55; 95% CI = 1.44–1.67) compared to those experiencing low WLI. When gender was added (M2), the OR of subsequent LTSA for those with high WLI remained similar. Adjusting for children, partner, SEP, work position (employee or manager), age and general health (M3) decreased the elevated risk of a subsequent LTSA slightly (OR = 1.39; 95% CI = 1.29–1.51) and increased the risk for women in relation to men (OR = 1.93; 95% CI = 1.79–2.09). Lastly, in M5, the interaction term (wave*WLI) was not significant. Among the covariates, having children and a partner was non-significant, while those with a higher non-manual or a managing position had lower odds for LTSA. Poor health correlated with higher odds of LTSA.

Focusing on gender difference, a larger proportion of women reported high WLI (26%) than the proportion of men (20%). Gender showed no moderating effect (OR = 1.01, 95% CI = 0.85–1.19). In separate gender analysis (Supplementary material), results showed marginal differences in ORs for LTSA for women and men with high WLI (women: OR = 1.39, 95% CI = 1.26–1.52; men: OR = 1.44, 95% CI = 1.24–1.67). For both men and women, the interaction term (wave*WLI) was non-significant.

Discussion

This study set out to explore the effect of WLI on objectively measured sickness absence. We analysed data from a longitudinal cohort of Swedish workers linked by the personal identity number to MiDAS register on sickness absence covering 8 years. Our results show that WLI is a risk factor for subsequent LTSA after adjustment for other possible risk factors and that the relationship between WLI and LTSA remains stable over time. These results make a significant contribution to the existing literature and the understanding of the burden of health due to interference over time.[10,13,14]

We found no moderating effect of gender, and the gender-separated analyses showed men and women with high WLI have similar odds of subsequent LTSA. Thus, our results support Nilsen *et al.*,[10] who likewise us, found no moderating effect of gender on WLI and subsequent sickness absence. This is also in accordance with a recent Swedish study where men and women exposed to double burden had elevated risk of sickness absence.[18] However, in contrast to previous findings,[14] we found that having children living at home as well as the existence of a partner did not play an important role in the effect of WLI on sickness absence when controlling for other variables. In this, our findings are in line with previous studies investigating the relationship between parenthood and sickness absence, which present little overall evidence that having children in and of itself has any substantial impact on sickness absence for women, at least in Sweden.[12]

Sweden has a high share of female labour participation.[29,30] Meanwhile, Sweden have a generous parental leave scheme and extensive public child care.[16] Besides parental leave, Swedish parents, also have the possibility of taking temporary parental leave to attend to sick children. Parents might thus use parental leave to buffer against WLI, which should be explored in future studies. Previous studies show that in Norway, taking parental leave and sharing this leave between both parents can reduce WLI[31] and, on a European level, reduce mental illness.[32] Meanwhile, first-time parents in Sweden who share parental leave equality had an increased risk for LTSA.[18] Further studies are needed to elucidate on risk factors of WLI and in specific on parental roles.

This study has both strengths and limitations. The register-based LTSA linked to data approximately representative of the Swedish working population enable analyses beyond regular subjective measurements. Furthermore, our analyses relies on a longitudinal analysis technique that allows us to model longitudinal data with repeated outcome variables with efficient adjustment for subject. GEE provides more robust results than traditional regression analysis, although standard GEE does not differentiate between cross-sectional (between participants) and longitudinal (within participants) relationships. However, here, we predict only LTSA occurring after answering the questionnaire while, at the same time, excluding participants with LTSA during the 3 years preceding the questionnaire. Such, we minimize between-participants effects.

In conclusion, this study shows that WLI is a risk factor for subsequent LTSA for working men and women in Sweden. There are no gender differences to these results. The study results implicate that employers enabling employees to combine work and private life without a struggle can reduce risks of sickness absences and loss of production.

Supplementary data

Supplementary data are available at *EURPUB* online.

Funding

This work was supported by the Swedish Research Council for Health, Working Life and Welfare (Forte) under grant no. 2018-01190; the Stockholm Stress Centre, funded by Forte under grant no. 2009-1758; and the Swedish Research Council under grant no. 2009-06192, 2013-01645, 2013-01646 and 2015-06013.

Conflicts of interest: Authors have no conflicts of interest.

Key points

- This longitudinal study explores the relationship between work–life interference and objectively measured long-term sickness absence (LTSA).
- Work–life interference is a risk factor for subsequent LTSA.
- There is no difference between women and men in the risk of subsequent LTSA.
- Employers can reduce risks of sickness absences and loss of production if they acknowledge and enable a good work–life balance for employees.

References

1 Greenhaus JH, Beutell NJ. Sources of conflict between work and family roles. *Acad Manag Rev* 1985;10:76–88.

2 Byron K. A meta-analytic review of work–family conflict and its antecedents. *J Vocat Behav* 2005;67:169–98.

3 Fahlén S. Does gender matter? Policies, norms and the gender gap in work-to-home and home-to-work conflict across Europe. *Community Work Fam* 2014;17:371–91.

4 Allen TD, Johnson RC, Saboe KN, et al. Dispositional variables and work–family conflict: a meta-analysis. *J Vocat Behav* 2012;80:17–26.

5 Borgmann L-S, Rattay P, Lampert T. Health-related consequences of work-family conflict from a European perspective: results of a scoping review. *Front Public Health* 2019;7:189.

6 Bergs Y, Hoofs H, Kant I, et al. Work-family conflict and depressive complaints among Dutch employees: examining reciprocal associations in a longitudinal study. *Scand J Work Environ Health* 2018;44:69–79.

7 Innstrand ST, Langballe EM, Espnes GA, et al. Positive and negative work–family interaction and burnout: a longitudinal study of reciprocal relations. *Work Stress* 2008;22:1–15.

8 Langballe EM, Innstrand ST, Aasland OG, Falkum E. The predictive value of individual factors, work-related factors, and work-home interaction on burnout in female and male physicians: a longitudinal study. *Stress Health* 2011;27:73–87.

9 Leineweber C, Baltzer M, Magnusson Hanson LL, Westerlund H. Work–family conflict and health in Swedish working women and men: a 2-year prospective analysis (the SLOSH study). *Eur J Public Health* 2013;23:710–6.

10 Nilsen W, Skipstein A, Ostby KA, Mykletun A. Examination of the double burden hypothesis—a systematic review of work-family conflict and sickness absence. *Eur J Public Health* 2017;27:465–71.

11 Allen TD, Martin A. The work-family interface: a retrospective look at 20 years of research in JOHP. *J Occup Health Psychol* 2017;22:259–72.

12 Leineweber C, Falkenberg H. A review of work and family research in Nordic regions. In: Shockley KM, Shen W, Johnson RC, editors. *The Cambridge Handbook of the Global Work-Family Interface. Cambridge*: Cambridge University Press, 2018.

13 Väänänen A, Kevin MV, Ala-Mursula L, et al. The double burden of and negative spillover between paid and domestic work: associations with health among men and women. *Women Health* 2004;40:1–18.

14 Lidwall U, Marklund S, Voss M. Work–family interference and long-term sickness absence: a longitudinal cohort study. *Eur J Public Health* 2010;20:676–81.

15 Altintas E, Sullivan O. Fifty years of change updated: cross-national gender convergence in housework. *Dem Res* 2016;35:455–70.

16 Hagqvist E, Nordenmark M, Pérez G, et al. Parental leave policies and time use for mothers and fathers: a case study of Spain and Sweden. *Soc Health Vulnerability* 2017;8:1374103.

17 Hagqvist E. Toward gender equality in practice? Cross-national patterns of change in the gendered division of housework over two decades. *J Comp Fam Stud* 2018;49:355–77.

18 Lidwall U, Voss M. Gender equality and sick leave among first-time parents in Sweden. *Scand J Public Health* 2020;48:164–71.

19 The Swedish Social Insurance Agency. 2021. https://www.forsakringskassan.se/wps/wcm/connect/cf56c741-1668-43c2-887d-10dd6c243cde/socialforsakringen-i-siffror-2020-engelsk.pdf?MOD=AJPERES&CVID (11 March 2021, date last accessed).

20 Staland-Nyman C, Houkes I, de Rijk A, et al. Gender equality in domestic work and sickness absence—a population-based study on women and men in Sweden. *Women Health* 2021;61:325–36.

21 Borgmann L-S, Rattay P, Lampert T. Longitudinal analysis of work-to-family conflict and self-reported general health among working parents in Germany. *Int J Environ Res Public Health* 2020;17:3966.

22 Nilsen W, Skipstein A, Demerouti E. Adverse trajectories of mental health problems predict subsequent burnout and work-family conflict—a longitudinal study of employed women with children followed over 18 years. *BMC Psychiatry* 2016;16:384.

23 Nohe C, Meier LL, Sonntag K, Michel A. The chicken or the egg? A meta-analysis of panel studies of the relationship between work–family conflict and strain. *J Appl Psychol* 2015;100:522–36.

24 Magnusson Hanson L, Leineweber C, Persson V, et al. Cohort profile—The Swedish Longitudinal Occupational Survey of Health (SLOSH). *Int J Epidemiol* 2018;47:691–692i.

25 Fisher GG, Bulger CA, Smith CS. Beyond work and family: a measure of work/nonwork interference and enhancement. *J Occup Health Psychol* 2009;14:441–56.

26 Leineweber C, Kecklund G, Lindfors P, Hanson LLM. Change in work–time control and work–home interference among Swedish working men and women: findings from the SLOSH cohort study. *Int J Behav Med* 2016;23:670–8.

27 Lee JH, Herzog TA, Meade CD, et al. The use of GEE for analysing longitudinal binomial data: a primer using data from a tobacco intervention. *Addict Behav* 2007;32:187–93.

28 Wang M. Generalized estimating equations in longitudinal data analysis: a review and recent developments. *Adv Stat* 2014;2014:1.

29 Hegewisch A, Gornick JC. The impact of work-family policies on women's employment: a review of research from OECD countries. *Community Work Fam* 2011;14:119–38.

30 Korpi W, Ferrarini T, Englund S. Women's opportunities under different family policy constellations: gender, class, and inequality tradeoffs in western countries re-examined. *Soc Polit Int Stud Gender State Soc* 2013;20:1–40.

31 Kotsadam A, Finseraas H. The state intervenes in the battle of the sexes: causal effects of paternity leave. *Soc Sci Res* 2011;40:1611–22.

32 Borrell C, Palència L, Muntaner C, et al. Influence of macrosocial policies on women's health and gender inequalities in health. *Epidemiol Rev* 2014;36:31–48.