Effects on cigarette consumption of a work–family supportive organisational intervention: 6-month results from the work, family and health network study

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Abstract

Background—Observational studies have linked work–family issues with cigarette consumption. This study examined the 6-month effects on cigarette consumption of a work–family supportive organisational intervention among nursing home workers.

Methods—Group randomised controlled trial where 30 nursing homes across New England states were randomly assigned to either usual practice or to a 4-month intervention aimed at reducing work–family conflict via increased schedule control and family supportive supervisory behaviours (FSSB). Cigarette consumption was based on self-reported number of cigarettes per week, measured at the individual level.

Results—A total of 1524 direct-care workers were enrolled in the trial. Cigarette consumption was prevalent in 30% of the sample, consuming an average of 77 cigarettes/week. Smokers

at intervention sites reduced cigarette consumption by 7.12 cigarettes, while no reduction was observed among smokers at usual practice sites (b=−7.12, 95% CI −13.83 to −0.40, p<0.05) (d=−0.15). The majority of smokers were US-born White nursing assistants, and among this subgroup, the reduction in cigarette consumption was stronger (b=−12.77, 95% CI −22.31 to −3.22, p<0.05) (d=−0.27). Although the intervention prevented a decline in FSSB (d=0.08), effects on cigarette consumption were not mediated by FSSB.

Conclusions—Cigarette consumption was reduced among smokers at organisations where a work–family supportive intervention was implemented. This effect, however, was not explained by specific targets of the intervention, but other psychosocial pathways related to the work–family interface.

INTRODUCTION

Cigarette smoking remains one of the leading causes of preventable deaths and illnesses,[1] and it is one of the behavioural pathways by which adverse work environments increase workers' risk for chronic disease, sickness absence and disability.[2 3] In the USA, smoking remains concentrated among low-education and low-income workers.[4] Investigating workplace determinants of smoking for direct-care workers, a rising employment sector in the USA is significant given its elevated prevalence of smoking (23.7%), higher than the national average for US working adults of 17.8%.[1] Certified Nursing Assistants (CNAs) perform the majority of resident-care duties at nursing homes and other extended-care facilities.[5] In the USA, most CNAs are women, and about half this workforce is African-American or Hispanic, and one in five is foreign born. Likewise, 62% of CNAs lack college degrees, and about two-thirds of CNAs live in poor or low-income households.[6–8] In addition, there are many CNAs who are young single mothers coping with both work and family responsibilities.[9] CNAs, therefore, are exposed to multiple caregiving demands on the job and at home.[10–12] Consequently, implementing and evaluating worksite interventions promoting health and well-being for such a disadvantaged socioeconomic group working in stressful jobs is an important step forward for the promotion of occupational health and the reduction of occupational health disparities.

Observational studies among direct-care workers have shown associations between work–family conflict and cigarette consumption.[13–15] Work–family conflict, in turn, has been linked with low schedule control (eg, rigid schedules, overtime), and low supervisory support for work–family concerns.[16] Cigarette consumption has also been associated with low supervisory support[3 17 18] and adverse scheduling patterns (eg, rigid schedules, rotating shifts, lack of breaks).[19–21] Since most evidence is based on observational designs, it is important to examine whether experimental designs based on work–family supportive organisational modifications would impact cigarette consumption. Organisational modifications, such as increasing supervisory support for employees' work–family concerns, and control over work hours, have reduced work–family conflict among workers of the information technology industry.[22] These pathways have also improved safety-related outcomes among direct-care workers.[23] However, it is unclear whether work–family organisational changes, namely supervisory support for work–family concerns and schedule control would reduce cigarette consumption.

The aim of this study is to examine the 6-month effects on cigarette consumption of a work–family supportive organisational intervention intended to reduce work–family conflict via increased supervisory support for employees' work–family concerns, and schedule control. This study is part of the Work, Family and Health Network (WFHN), the largest (to our knowledge) work–family intervention study to date. The WFHN is a multidisciplinary research consortium funded by the National Institutes of Health to launch a group-randomised controlled trial, where 30 nursing homes were randomised to an intervention (experimental condition) or usual practice (control condition). Six-month direct and mediated effects of the intervention on cigarette consumption were examined. Direct effects refer to the average difference in cigarette consumption between smokers at experimental sites compared with smokers in control sites. Indirect effects refer whether changes in cigarette consumption were mediated by intended increments in family supportive supervisory behaviours and schedule control or by intended reductions in work–family conflict.

METHODS

Study population

Details regarding the conceptual framework, design and randomisation strategy and of the WFHN study can be found elsewhere.[24 25] Nursing homes were recruited, thanks to a partnership with a private corporation in the extended-care industry, which had a total of 56 facilities in the New England states of Massachusetts, Vermont, New Hampshire, Rhode Island and Connecticut. Of those, 30 nursing homes met the inclusion criteria for the trial. Nursing homes were randomised into intervention or usual practice conditions (1:1 allocation rule). Adaptive randomisation was applied in order to balance condition assignment based on three criteria: location, retention rate and number of employees per site.[25] The research team randomised worksites into a condition as soon as data collection was ready to begin in order to reduce the likelihood of a randomised site dropping out of the study before baseline assessments. Field interviewers were blind to randomisation outcomes.

Inclusion/exclusion criteria

Nursing homes were excluded if they were in isolated locations where no comparable worksite could be matched, if they employed fewer than 30 direct-care workers, or if they were acquired within a year prior to study initiation. At randomised facilities, employees eligible to participate were those with direct-care responsibilities such as Registered Nurses (RNs), Licensed Practical Nurses (LPNs) or Certified Nursing Assistants (CNAs), working 24 hours or more per week. Regular night shift workers were excluded. Eligible participants provided informed written consent to complete a computer-assisted personal interview (CAPI) and received a US$20 supermarket debit card as incentive for participation. As shown in the CONSORT diagram (figure 1), at baseline, a total of 1524 of 1783 eligible workers completed the CAPI questionnaire (response rate 85%). Baseline data collection occurred from September 2008 to May 2011. The 6-month follow-up assessments were conducted after the delivery of the intervention at each site, and started on September 2010 and lasted until November 2011. This study was approved by appropriate Institutional Review Boards.

Work–family supportive organisational intervention

The intervention was titled STAR (Support; Transform; Achieve; Results), and was based on social and organisational changes aimed at enhancing employees' control over work hours, and increase supervisory support for employees' work–family concerns. In brief, the intervention was delivered over 4 months per nursing home. Delivery occurred in three stages: (1) preparing for change, (2) setting the change in motion and (3) sustaining the change.

The first stage had the objective of assessing the readiness of each nursing home for the intervention. During this state, contents of two prior interventions developed by the research team that effectively improved family supportive supervisor behaviours, and employee schedule control in two different industries were adapted for the direct-care industry.[26 27] The preparatory stage was targeted at the top management and supervisors at each nursing home. Activities included education sessions regarding the importance of the work–family interface, computer-based training on family supervisory supportive behaviours, and self-paced computer-based exercises during 2 weeks where supervisors monitored their own family supportive behaviours towards employees.

The second stage had the objective of introducing organisational changes. This state was targeted to employees and supervisors. Over a period of 2 weeks, an intervention facilitator led eight participatory sessions (1 hour duration per session) with the goal of discussing how work procedures could transition from a time-based to a result-based culture. Sessions included activities such as educational presentations regarding the importance of schedule control and family supervisory supportive behaviours, role-playing, round tables and other team exercises. During this stage, supervisors and employees were also asked to make procedural changes to their work; for instance, employers and managers together discussed ways to change shift structures, for example, starting or ending the shift during different hours. Afterwards, supervisors and employees were asked to provide feedback to monitor these procedural changes through web polls over a period of 2 weeks. Supervisors received four more hours of family supportive training, and attended additional meetings to discuss ways to be more supportive of employees' work–family issues. After the training, each supervisor completed another round of computer-based self-monitoring of their own work–family supportive behaviours.

Finally, the aim of the third stage was to sustain organisational changes, and included activities such as forums among all employees and supervisors to identify challenges and successes of the implemented changes. Supervisors provided feedback regarding their training and computer-based self-monitoring. More details regarding the rationale, contents and delivery of the intervention can be found elsewhere.[28]

Outcome

Cigarette consumption was measured with questions from the National Health Interview Survey (NHIS), 2010 edition.[29] Individual-level information was collected regarding the frequency of smoking (every day, some days and never), and the number of cigarettes per week (outcome variable).

Mediators

Work–family conflict was measured with two subscales with five items each, reflecting the extent to which work and/or family roles interfered with each other.[30] An example item of work-to-family interference was 'due to work related duties, you have to make changes to your plans for family or personal activities'. A sample item of family-to-work interface was 'family-related strain interferes with your ability to perform job-related duties'. Items were measured with a Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Cronbach's α for work-to-family interference were 0.88 and 0.90 for baseline and follow-up measures, respectively. Cronbach's α for family-to-work interference were 0.82 and 0.82 for baseline and follow-up measures, respectively.

Family supportive supervisory behaviours (FSSB) was measured with a four-item questionnaire asking about different types of supervisory support (eg, emotional, instrumental, role modelling and creative management).[31] An example item is 'your supervisor works effectively with employees to creatively solve conflicts between work and non-work'. These items were measured with a Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Cronbach's αs were 0.89 and 0.9 at baseline and at the 6-month follow-up, respectively.

Schedule control refers to the extent employees were able to choose several work-time domains (eg, start/end times, few hours off, vacation).[32] This construct was measured with a six-item questionnaire coded with a Likert scale ranging from 1 (very little choice) to 5 (very much choice). Cronbach's αs were 0.65 and 0.90 at baseline and at the 6-month follow-up, respectively.

Covariates

Covariates were self-reported with the CAPI baseline assessment. Employees were asked about their gender (male or female), race/ethnicity (non-Hispanic White vs others), US-born status (yes/no), and presence of children under 18 years of age at home (yes/no). Occupation was assessed by asking job titles, and coded as RNs/LPNs CNAs.

Analyses

Descriptive statistics for baseline variables were computed. Baseline Pearson correlations between cigarette consumption and the mediating variables were performed. An intent-to-treat approach was used with random intercept linear models to examine direct and indirect effects of the intervention on cigarette consumption. Direct effects refer to the 6-month average difference in cigarette consumption between smokers at intervention versus control sites. Indirect effects of the intervention on cigarette consumption were tested including each of the three mediators (work–family conflict, FSSB and schedule control) one at a time into a regression model. Direct and indirect effects were compared between CNAs versus RNs/ LPNs, between US-born versus foreign-born workers, and between those who reported children in their households versus those who did not. Cohen's d (standardised mean difference) was computed as measure of effect size. All multilevel linear models corrected its SEs for clustering of employees by study condition, nursing home, and wave. Analyses were two-tailed with a 0.05 level of significance.

RESULTS

Table 1 shows descriptive statistics for workers at intervention (n=725) and usual practice (n=799) conditions. Most direct-care workers were women (90%), CNAs (70%), US-born non-Hispanic White (62%), with presence of children at home (58%). Averages of work–family conflict, schedule control and FSSB are also presented in table 1. At baseline, 30% of participants reported smoking on some days or every day, with an average of 77 cigarettes/week. Cigarette consumption was similar across study conditions, and did not vary across nursing homes with an intraclass correlation of 0.02. Smokers were more likely to be US-born non-Hispanic White (81.13%) than of other races/ethnicities (18.87%). CNAs (75.11%) were more likely to be smokers than RNs/LPNs (24.89%). Smoking status did not vary according to presence of children at the household (41.58% vs 58.13%). Means of work–family conflict, FSSB and schedule control were similar between smokers and nonsmokers (table 1).

As shown in the CONSORT diagram (figure 1), at the 6-month follow-up, 121 participants had left the usual practice condition, and 128 subjects had left the intervention condition, with no statistically significant differences in attrition across conditions (n=249; 16.3% attrition rate). Although nearly half the dropouts were baseline smokers (n=111; 44.5%), smokers in either condition were equally likely to drop out from the study compared with non-smokers.

Direct effects of STAR on cigarette consumption

Direct effects of the STAR intervention on cigarette consumption were statistically significant; at the 6-month follow-up, smokers at intervention sites reduced their cigarette consumption by 7.12 cigarettes, while no such reduction was observed among smokers at usual practice sites (d=−0.15) (table 2). Direct effects were stronger among US-born Whites (d=−0.18), and CNAs (d=−0.20) (table 2). Among US-born, non-Hispanic White CNAs (n=322) who represented 58.74% of the smokers, intervention effects were even stronger (d=−0.27). Intervention effects did not vary according to presence of children in households.

Indirect effects of STAR on cigarette consumption

At baseline, cigarette consumption was not correlated with FSSB (r=0.03), schedule control (r=−0.03), work-to-family interference (r=−0.0) or family-to-work interference (r=−0.08). Effects of STAR on cigarette consumption were not mediated by the hypothesised mediators. STAR did not have a statistically significant effect on work-to-family interference or family-to-work interference, which were the primary targets of the intervention. Likewise, STAR did not have significant effects on schedule control. Among smokers, intervention effects on work–family conflict and schedule control were also not significant.

The intervention, however, prevented a decline in FSSB among all workers, and especially among smokers (table 3). At follow-up, the average of FSSB for the control condition was a tenth of a point below the baseline average, where the average in the experimental condition did not change (d=0.08). At intervention sites, US-born non-Hispanic CNAs smokers increased their reports of family supportive supervisory behaviours in about a

quarter of a point relative to smokers at control sites (d=0.28), though this effect was not significant at the 0.05 level (p=0.08) (table 3).

Despite the 6-month effects of STAR on FSSB, the average effect of STAR on cigarette consumption did not change when FSSB was included in the regression model (table 4). Although STAR had an additional reduction of 2.06 cigarettes/week at nursing homes that were above the grand mean of FSSB, this interactive effect was not statistically significant. Indirect effects were not statistically significant neither among smokers who were US-born non-Hispanic Whites or CNAs (table 4).

DISCUSSION

The aim of the study was to examine the 6 months effect on cigarette consumption of a work–family supportive organisational intervention among nursing home direct-care workers. This study contributed with experimental evidence regarding the association between smoking with work–family organisational factors, complementing observational evidence.[33] [34] Even though the intervention did not have tobacco control components, it had a small but statistically significant effect in reducing cigarette consumption (7.12 cigarettes/week, d=−0.15), especially among low-wage workers such as nursing assistants where smoking was highly prevalent. Since nursing homes in New England are smoke-free worksites (without differences in smoking policies between experimental and control sites),[35] the significant reduction in smoking intensity most likely happened outside the workplace.

Even though this study tested only the intended a priori mediators, other psychosocial pathways might explain the reduction in cigarette consumption. The intervention STAR was designed to reduce work–family conflict via increased schedule control and family supportive supervisory behaviours (FSSB). At the 6-month follow-up, STAR was not effective in reducing work–family conflict or in increasing schedule control. The intervention, however, was effective in preventing a decline in FSSB. Such decline was more noticeable among smokers, although effects on cigarette consumption were not mediated by FSSB. In fact, FSSB and cigarette consumption were not correlated at baseline. Therefore, the reduction on cigarette consumption was not the result of the intended organisational targets, but it is most likely explained by other psychosocial pathways related to the work–family interface. In this sense, studies have found associations between smoking with family characteristics such as composition (eg, single mothers), marital or parental issues and sick relatives.[36] [37] Other studies have shown a direct correlation between smoking intensity and psychosocial stressors, including job demands and workload,[38] [39] lower resources (eg, low control and predictability of the job), and lower social support at work.[3] Smokers could have been differentially affected by the intervention as a whole through other psychosocial pathways different than schedule control or FSSB.

The small effect is not surprising, considering that STAR did not target cigarette consumption. Despite the significant reduction, smokers at intervention worksites still consumed a large quantity of tobacco (67 cigarettes or 3.2 packs per week), which increases the risk of chronic disease. Prospective studies have documented higher mortality

risk with 1–4 cigarettes a day (7–28 per week) in men and women,[40] as well as a dose-response risk for smoking-related, all-cause mortality.[41] Successful workplace interventions on smoking cessation have included specific tobacco control components, for example, nicotine replacement options, group therapy or individual counselling,[42] or have been making comprehensive efforts to reduce adverse occupational exposures that interact with smoking.[43] Without specific tobacco control targets, organisational interventions might not produce changes on smoking cessation in the near term. Integrating tobacco control messages as part of occupational health, safety and wellness strategies are probably necessary to further reduce smoking rates at worksites.[44]

Strengths and limitations

Attrition is the main validity threat in this study; however, the 16.3% attrition rate at the 6-month follow-up is a concern only for statistical validity, given the loss of sample size. The internal validity is not affected because no prerandomisation characteristics, including smoking status or study condition, were associated with attrition. Moreover, the intervention was not differentially administered by smoking status or any other health or social features, ruling out potential sampling or selection-into-study biases. Sample size calculations were carried out considering other psychosocial (ie, work–family conflict) and did not consider cigarette consumption as an individual outcome,[25] therefore, this study may have been underpowered to detect changes in this outcome. Although a valid, reliable and common measure of cigarette consumption (NHIS) was used, it cannot rule out presence of misclassification of exposure, as the self-reported number of cigarettes per week may underestimate measures of actual tobacco consumption, such as serum cotinine levels,[45] especially in a racially diverse sample.[46] Finally, since cigarette consumption was not a primary target of the intervention, relevant questions regarding tobacco cessation were absent, such as assessments, for example, intention to quit, or abstinence during the last 7 days.[47] This study has strengths that should also be highlighted. Group randomised controlled trials are optimal designs to support causal claims, especially in occupational settings where experimental evidence is needed. Psychosocial measures were valid and reliable. The response rate of 85% increases the generalisability to other work environments with similar staffing characteristics.

Conclusions

Cigarette consumption was reduced among smokers who were randomly assigned to a work–family supportive organisational intervention. Direct effects were statistically significant with an average reduction of 7 cigarettes/week (d=−0.15). Reduction in cigarette consumption was greater among US-born non-Hispanic White worker CNAs (12 cigarettes/week; d=−0.27). However, effects of the intervention were not mediated by specific intervention components but possibly by other psychosocial pathways related to the work–family interface. This study adds experimental evidence that organisational interventions can impact cigarette consumption among direct-care workers. These results are relevant for the healthcare industry or other sectors that employ workers with low socioeconomic status.[9]

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Acknowledgements

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What is already known on this subject

Observational studies have linked cigarette consumption with work–family conflict and its predictors such as unsupportive supervisors and inflexible schedules.
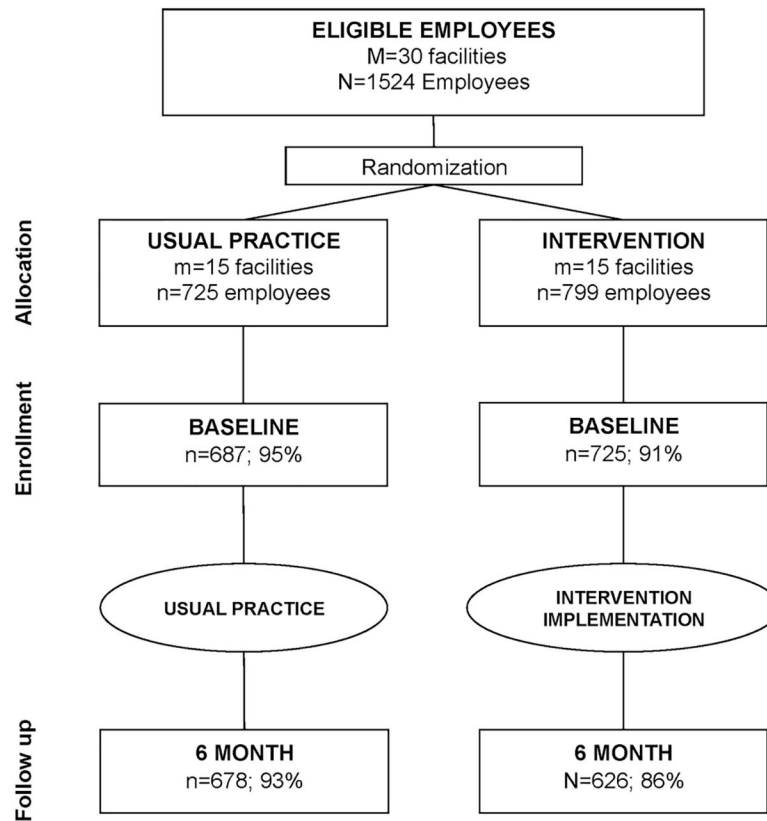
What this study adds

This study adds experimental evidence regarding the effect of a work–family supportive organisational intervention on cigarette consumption among direct-care workers, a low-wage workforce.

Figure 1.
CONSORT diagram showing enrolment, randomisation and follow-up of participants in the trial.

Table 1

Baseline distribution of participants (n=1524)

	Usual practice (n=15)				Intervention (n=15)			
	Sample (n=799)		Smokers (31.4%; n=251)		Sample (n=725)		Smokers (28.9%; n=210)	
	n	Per cent	n	Per cent	n	Per cent	n	Per cent
Age (years)								
(M, SD)	39	12.3	40.2	13	37.9	12.6	38.5	11.8
Sex								
Female	725	90.7	232	92.4	674	92.9	200	95.2
Male	74	9.3	19	7.6	51	7.1	10	4.8
Race/ethnicity								
non-Hispanic White	526	65.8	205	81.7	488	36.5	178	84.8
non-Hispanic African-American	100	12.5	10	4.0	104	14.4	10	4.8
Other	59	7.4	18	7.2	47	7.4	9	4.3
Hispanic	118	14.7	20	8.0	84	11.6	13	6.2
Nativity								
US-born	586	73.3	232	92.4	536	73.9	196	93.3
Other	213	26.6	19	7.6	189	26	14	6.7
Children in household								
Yes	460	57.6	99	39.4	388	53.5	116	55.2
No	339	42.4	152	60.6	337	46.4	94	44.8
Job title								
RN	81	10.1	19	7.6	78	10.8	20	9.5
LPN	138	17.3	40	15.9	131	18.1	32	15.2
CNA	558	69.8	184	73.3	498	68.7	151	71.9
FSSB								
(M, SD)	3.71	0.87	3.75	0.87	3.66	0.89	3.69	0.94
Schedule control								
(M, SD)	2.59	0.73	2.52	0.67	2.72	0.73	2.66	0.71
Work-to-family interference								
(M, SD)	2.75	0.89	2.86	0.95	2.84	0.93	2.85	0.97

	Usual practice (n=15)				Intervention (n=15)			
	Sample (n=799)		Smokers (31.4%; n=251)		Sample (n=725)		Smokers (28.9%; n=210)	
	n	Per cent	n	Per cent	n	Per cent	n	Per cent
Family-to-work interference								
(M, SD)	2.05	0.54	2.04	0.57	2.10	0.62	2.09	0.64

CNA, certified nursing assistant; FSSB, family supportive supervisory behaviours; LPN, licensed practical nurse; M, mean; RN, registered nurse.

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Table 2

Direct intervention effects on number of cigarettes per week among smokers, and US-born, non-Hispanic White workers

	Smokers (n=403)			US-White CNAs (n=233)		
	b	SE	95% CI		b	SE	95% CI	
Intercept	72.94***	3.61	65.54	80.34	74.34***	4.70	64.67	84.00
STAR	3.30	5.30	−7.56	14.16	8.42	6.85	−5.67	22.51
Wave	0.87	2.17	−3.59	5.32	4.37	3.13	−2.08	10.82
STAR*wave	−7.12*	3.28	−13.83	−0.40	−12.77*	4.63	−22.31	−3.22

*
p<0.01

**
p<0.05

***
p<0.001.

CNA, certified nursing assistant; STAR, Support; Transform; Achieve; Results; Wave, six month follow up.

Table 3

Intervention effects on family supportive supervisory behaviours (FSSB)

	Sample (n=1386)			Smokers (n=403)			US-White CNAs (n=233)		
	b	SE	95% CI	b	SE	95% CI	b	SE	95% CI
Intercept	3.72 ***	0.05	3.61 3.82	3.75 ***	0.07	3.60 3.89	3.83 ***	0.09	3.64 4.02
STAR	−0.05	0.07	−0.20 0.11	−0.07	0.10	−0.28 0.15	−0.08	0.13	−0.35 0.20
Wave	−0.10 ***	0.03	−0.17 −0.04	−0.20 ***	0.07	−0.33 −0.06	−0.33 ***	0.09	−0.52 −0.14
STAR*wave	0.07	0.05	−0.03 0.17	0.15	0.10	−0.05 0.35	0.25 *	0.14	−0.03 0.54

*
$p<0.01$

**
$p<0.05$

***
$p<0.001$.

CNA, certified nursing assistant; FSSB, family supportive supervisory behaviours; STAR, Support; Transform; Achieve; Results; Wave, six month follow up.

Table 4

Indirect intervention effects via FSSB on number of cigarettes per week among smokers, and US-born, non-Hispanic White workers

	Smokers (n=403)				US-White CNAs (n=233)			
	b	SE	95% CI		b	SE	95% CI	
Intercept	73.00 ***	3.68	65.47	80.53	74.60 ***	4.87	64.59	84.61
STAR	3.37	5.40	−7.68	14.42	8.64	7.09	−5.93	23.21
Wave	0.46	2.22	−4.08	5.00	3.33	3.26	−3.39	10.05
FSSB	−1.14	2.41	−5.87	3.59	−2.21	3.66	−9.40	4.97
STAR*FSSB	1.01	3.56	−5.99	8.00	0.19	5.01	−9.67	10.04
STAR*wave	−6.89 **	3.33	−13.71	−0.08	−12.22 **	4.76	−22.03	−2.42
Wave*FSSB	−1.70	2.82	−7.22	3.83	−2.72	4.34	−11.25	5.81
STAR*wave*FSSB	−2.06	4.04	−9.99	5.87	−0.61	5.88	−12.17	10.94

*
p<0.05

**
p<0.001

***
p<0.0001.

CNA, certified nursing assistant; FSSB, family supportive supervisory behaviours; STAR, Support; Transform; Achieve; Results; Wave, six month follow up.