Reducing Tobacco Use and Secondhand Smoke Exposure: Incentives and Competitions to Increase Smoking Cessation Among Workers

Summary Evidence Table

Studies of Incentives and Competitions When Implemented as Part of a Worksite-Based Effort to Reduce Tobacco Use Among Workers

Study	Intervention and Comparison	Population and Sample	Effect measure	Reported baseline	Reported effect	Value used in summary	Follow-up time
Author (Year): Burling 1989 **Study Period:** NR **Study Design:** individual randomized trial **Design Suitability:** Greatest **Quality of Execution (No of Limitations):** Fair (3) **Evaluation Setting:** Worksite (VA medical center)	**Location:** USA (Palo Alto, California) **Intervention:** Client education (computer sessions) + Client education (self-help materials) + Telephone cessation support + Incentives (10 day contests) + Serial carbon monoxide measurements Comparison: Client education (self-help materials) + Telephone cessation support + Incentives (10 day contest + Serial carbon monoxide measurements Note: Incentives (for cessation) were offered to both study arms in this trial	Recruited smoking employees N = 58 (participants randomly assigned to intervention or comparison groups) Group N Intervention 29 Comparison 29	1) Smoking cessation (abstinence) with biochemical verification 2) Self-reported cigarettes smoked daily 3) Participation rate	Baseline / 10 days (post) Intervention 0% / 48.3% Comparison 0% / 21.4% Intervention 26.86 Comparison 27.97	6 mo f/u 21.4% 11.5% 14.07 17.23 NR	9.9 pct pt (NS) –2.05 cigs/day (NS)	6 mo 6 mo
Author (Year): Glasgow 1993* **Study Period:** 1988 **Study Design:** group randomized trial	**Location:** USA (Salem and Portland, OR) Intervention: Incentives (contests and payments $10 for abstinence) + Serial	Recruited worksites N = 19 of 20 (95%) of invited worksites Stratified, random assignment of worksites to intervention or	1) Smoking cessation (abstinence) with biochemical verification	Baseline / End (1yr Int) Intervention 0% / 10.8% Comparison 0% / 11.6%	1 year f/u 14.2% 11.5%	2.7 pct pt ANCOVA-site NS Logistic regression-	2 yr (1 yr from end of Int)

Study	Intervention and Comparison	Population and Sample	Effect measure	Reported baseline	Reported effect	Value used in summary	Follow-up time
Design Suitability: Greatest **Quality of Execution (No of Limitations):** Fair (3) **Evaluation Setting:** Worksites *Note: Also Glasgow 1990 and 1991	carbon monoxide measurements **Intervention period:** 1 yr **Comparison:** Usual care	comparison groups Group N Intervention 8 Comparison 10 Cohort of self-reported smokers at baseline Group b/l f/u Inter 474 NR Comp 623 NR Overall f/u at end of study was 70% Smokers lost to f/u were excluded	2)Self-reported smoking cessation (abstinence) Baseline End (1yr Int) Intervention 0% 12.9% Comparison 0% 12.0% 3) Participation rate	1 yr f/u 18.0% 15.5% 23% (109) of smokers in the cohort at the intervention worksites	employee NS 2.5 pct pt ANCOVA-site NS Logistic regression-employee p<0.03	2 yr (1 yr from end of Int)
Author (Year): Gomel 1993 **Study Period:** NR **Study Design:** group randomized trial **Design Suitability:** Greatest **Quality of Execution (No of Limitations):** Fair (3) **Evaluation Setting:** Worksites	**Location:** Australia (Sydney) 4 study arms **Intervention:** 1) HRA (Individualized assessment of cardiovascular disease risk factors) + Client education (standardized general advice on lifestyle changes) 2)HRA + Client education + Client counseling (up to 6 sessions with assessment and feedback) 3) HRA + Client education + Client counseling + Incentives and competition	Random sample of eligible worksites in study region N eligible: NR N = 28 sites recruited Group Sites 1 8 2 6 3 4 4 10 Employees recruited: N = 431 Arm n n smokers 1 82 34 2 124 25 3 95 32 4 130 31 Smokers lost to f/u were retained	Self-reported continuous smoking cessation (abstinence) with biochemical verification Baseline f/u 6 mo HRA+Edu 0% 0% HRA+Couns+Edu 0% 14% HRA+Couns+Edu+Inc & Compt 0% 6.5% HRA only 0% 3% Smoking cessation (abstinence) with biochemical verification HRA+Edu 3% HRA+Couns+Edu 7% HRA+Couns+Edu+Inc & Compt 13% HRA only 13% Participation rate	12 mo f/u 0% 10% 3.5% 0% 7% 20% 3% 5% 88% of	0 pct pt NS 10 pct pt NS 3.5 pct pt NS ref 2 pct pt NS 15 pct pt NS –2 pct pt NS ref	12 mo 12 mo

Study	Intervention and Comparison	Population and Sample	Effect measure	Reported baseline	Reported effect	Value used in summary	Follow-up time
	(individual contests for behavior change; team competition for participation) Intervention period: 10 wk 4) Comparison HRA only (Individualized assessment of CV risk factors)				eligible employees, but participation of smokers was NR		
Author (Year): Gottlieb (1990) **Study Period:** 1986–1987 **Design Suitability:** Least **Study Design:** before-and-after for cessation results **Study Design:** group non-randomized trial for participation results **Design Suitability:** Greatest **Quality of Execution (No of Limitations):** Fair (4) **Evaluation Setting:** Worksites (TX Dept of Human Services)	**Location:** USA (Austin, Houston, and San Antonio, TX) Intervention: Incentives and competition (individual cessation contest; team participation) + Smoking cessation contest (cessation event without incentives) + Client education (self-help orientation and materials) **Comparison:** Smoking cessation contest + Access to client education (self-help orientation and materials)	Selected worksites in Texas Dept of Human Services in 3 metro areas N = 12 assigned to intervention or comparison <u>Group</u> <u>N sites</u> Int 6 Comp 6 Smokers recruited in both groups <u>b/l</u> <u>6 mo f/u</u> 43 27 (63%) Smokers lost to f/u retained	1) Smoking cessation (abstinence) with biochemical verification by recruited smokers 2) Participation rate by employees Intervention Comparison	0%	3 (6.9%) of 43 <u>N</u> <u>% particip</u> 47 28% 9 9%	6.9 pct points 19 pct pt $X^2 = 28.536$ (1df), p<.001	6 mo
Author (Year): Hennrikus (2002)	**Location:** USA (Minneapolis-St. Paul,	Worksites (300–1000 employees)	1) Self-reported 7-day point prevalence of smoking				24 mo

Study	Intervention and Comparison	Population and Sample	Effect measure	Reported baseline	Reported effect	Value used in summary	Follow-up time
Study Period: 1995–1999 **Design Suitability:** Greatest **Study Design:** group randomized trial **Quality of Execution (No of Limitations):** Fair (3) **Evaluation Setting:** Worksites	MN) **Intervention:** Smoking cessation groups (13 sessions over 2 months) Telephone cessation support (3–6 counseling sessions) + Client education self-help Choice: Group or telephone + Self-help Incentives (direct payments $10, $20 for participation; and direct payment $20 and lottery contest for cessation) **Comparison:** With and without incentives	N = 78 eligible N = 24 (31%) recruited Stratified, random assignment (4 sites per arm) n = 2482 eligible smokers Arm n smokers Phone 305 Phone+Inc 481 Group 415 Group+Inc 380 Choice 418 Choice+Inc 483 Study arms were collapsed in the reported analyses	cessation (abstinence) Telephone+Edu+Incentives Groups+Incentives Choice+Incentives All study arms with Incentives All study arms w/o Incentives 2) Participation rate (registered for) Incentives No Incentives Telephone + Edu+Incentives Choice+Incentives	Baseline 12 mo 24 mo 0% 16.6% 20.3% 0% 11.5% 15.5% 0% 16.0% 18.9% 0% 14.5% 18.9% 0% 14.8% 17.6% % registered 22.4% 11.9% 16.9% 20.0% 15.0%	p = .0812 1.3 pct pt adjusted analysis p = 0.4146 10.5 pct pt adjusted analysis p = .0054	
Author (Year): Jason (1990) **Study Period:** 1988 **Study Design:** group non- randomized trial **Design Suitability:** Greatest **Quality of Execution (No of Limitations):** Fair (4) **Evaluation Setting:** Worksites	**Location:** USA (not reported) Intervention: Smoking cessation program offered to employees (3 week quitting program and 6 months of cessation support) **Incentives for participation:** $10 per meeting; for abstinence: $1/day up to $180 plus a lottery contest) and competitions (3 person teams) + Cessation support groups + Social	Selected worksites N = 2 with one worksite assigned to intervention, one to comparison Recruited smoking employees at each worksite Arm n n recruits Int 63 53 (84%) Comp 52 42 (81%)	1) Self-reported continuous cessation (abstinence) with biochemical verification Intervention Comparison 3) Smoking cessation (point abstinence) with biochemical verification Intervention Comparison 4) Participation rate among smoking employees Intervention Comparison Note: Participants in the incentives and competition arm earned an average of $237	Baseline 6 mo (End of Int) 0% 34% 0% 5% 0% 42% 0% 13%	21% 5% 36% 16% 84% 81%	Diff 16 pct pt 95% CI (2, 30) 20 pct pt 95% CI (1, 39) 3 pct pt NR	6 mo (12 mo after start) 6 mo (12 mo after start)

Study	Intervention and Comparison	Population and Sample	Effect measure	Reported baseline	Reported effect	Value used in summary	Follow-up time
	support (buddy program) + Serial carbon monoxide breath testing + Offer of self-help materials **Comparison:** Carbon monoxide breath test at enrollment						
Author (Year): Jason 1997* **Study Period:** not reported **Study Design:** group randomized trial **Design Suitability:** Greatest **Quality of Execution (No of Limitations):** Fair (3) **Evaluation Setting:** Worksites *Note: Also Jason 1995	**Location:** USA (Chicago, IL) **Intervention:** (3 study arms) 1) GIM: Smoking cessation media series + Cessation groups (6 months) + Incentives + Serial carbon monoxide measures + Client education (self-help) 2) IM: Smoking cessation media series + Incentives + CO measures + client education (self-help) **Comparison:** 3) M: Smoking cessation media series + CO measures + Client education (self-help)	Invitations offered to random selection of 400 Chicago-area companies N = 63 (16%) were recruited with matched,random assignment to intervention or comparison N = 58 companies at f/u (92%) Recruited smoking employees: 844 Arm n GIM 283 IM 281 M 280	1) Smoking cessation (point abstinence) with biochemical verification Note: These results used in the assessment of effectiveness 2) Self-reported continous smoking cessation (abstinence) with biochemical verification Note: This analysis restricted to 16%–30% of participants with complete data 3) Participation rate Note: Incentive payments up to $175	Baseline / 12mo / 24mo GIM 0% / 20.7% / 18.2% IM 0% / 9.7% / 13.2% M 0% / 7.4% / 10.3% GIM 0% / 31.2% / 19.8% IM 0% / 11.0% / 13.3% M 0% / 5.1% / 4.5% GIM 55% IM 59% M 58%	7.9 pct pt (NS) 2.9 pct pt (NS) ref Note: GIM vs other: significant 15.3 pct pt (NS) 8.8 pct pt (NS) ref –3 pct pt NR 1 pct pt NR ref	18 mo (24 mo after start) 18 mo (24 mo after start)

Study	Intervention and Comparison	Population and Sample	Effect measure	Reported baseline	Reported effect	Value used in summary	Follow-up time
Author (Year): Jeffery 1993 **Study Period:** 1987–1990 **Study Design:** group randomized trial **Design Suitability:** Greatest **Quality of Execution (No of Limitations):** Fair (3) **Evaluation Setting:** Worksites	**Location:** USA (Minneapolis, MN) Intervention (Healthy Work Project): Smoking cessation groups (11 sessions over 5 months) + Incentives (personal payroll withholding) + Serial carbon monoxide measurements 4 intervention rounds over a 2 year period **Comparison:** Usual care	Recruited eligible worksites Group N sites Intervention 16 Comparison 16 400–900 employees: (Eligible) N = 118 (Recruited) N = 32 (27%); randomly assigned Employee surveys used to generate company results (cohort f/u and cross-sectional)	1)Self-reported smoking prevalence (cohort f/u) Intervention Comparison 2)Self-reported smoking prevalence (Cross-sectional) Intervention Comparison 3)Participation rate Note: Interventions offered in 4 rounds over 2 years; follow-up periods for individuals were not reported	 24.75 23.76 25.47 24.73 	2 years after program start 21.76 22.82 22.47 25.76 N = 270 Mean per site: 16.9 persons Estimate of eligible smokers participating: 12.4%	 –2.11 pct pt F(1,30) = 5.19, p = .03 –4.02 pct pt F(1,30) = 3.73, p = .0581	Up to 18 mo (2 yr after start)
Author (Year): Klesges 1987 **Study Period:** NR **Study Design:** group randomized trial **Design Suitability:** Greatest **Quality of Execution (No of Limitations):** Fair (4) **Evaluation Setting:** Worksites	**Location:** USA (Fargo ND and Eugene, OR) **Intervention:** 4 study arms 1)(GIR) Smoking cessation groups (6 weekly sessions) + Incentives and Competition (teams; participation and cessation) + Relapse prevention groups (2 sessions) 2)(GI) Smoking cessation groups + Incentives and competition 3) (GR) Smoking	Selected worksites N = 8 sites stratified and randomly assigned Group # sites G 2 GI 2 GR 2 GIR 2 N = 480 estimated eligible smokers (at 8 worksites) N = 136 participants N = 127 (93%) participants at 6 month f/u	1)Smoking cessation (point abstinence) with biochemical verification Baseline Post-int G 0% 19% GI 0% 30% GR 0% 14% GIR 0% 47% 2)Participation rate	 	9% 7% 14% 17% Not reported by study arm (reported as similar) Overall: 136 of 480 (48%)	 ref –2 pct pt 5 pct pt 8 pct pt Overall abstinence rate at 6 mo was 12% (15/127)	6 mo (2.5 mo after end of the two relapse group sessions)

Study	Intervention and Comparison	Population and Sample	Effect measure	Reported baseline	Reported effect	Value used in summary	Follow-up time
	cessation groups + Relapse prevention groups Comparison: 4) (G) Smoking cessation groups Intervention period 6 weeks (plus 3.5 months for 2 relapse sessions)						
Author (Year): Koffman 1998 **Study Period:** 1990–1991 **Study Design:** group non-randomized trial **Design Suitability:** Greatest **Quality of Execution (No of Limitations):** Fair (3) **Evaluation Setting:** Worksites Note: Workplace smoking ban adopted in all study sites 1 month prior	**Location:** USA (California) Intervention: 1) MC: Smoking cessation program (no fee) 2) IC: Smoking cessation program + Incentives and competition ($50 fee) Cessation program included: Groups + Self-help materials + Telephone cessation support (for 12 mo) + Maintenance sessions **Incentives included:** Team competition for $2500 prize + Monthly individual payments for abstinence ($15/month) Comparison: UC: Traditional smoking cessation program: (Groups [3 wk] + Self-help with a $20 fee refundable at completion)	Selected worksites N = 3 sites assigned to intervention or comparison Arm Employees MC 5943 IC 3300 UC 2500 Smoking employees recruited to participate in the intervention Arm Participants MC 80 IC 68 UC 29 Participants lost to f/u were counted as smokers	1) Smoking cessation (7-day point abstinence with biochemical verification in the intervention arms Baseline 6 months 12 months MC IC UC 2) Participation rate (of total employees) MC IC UC	0% 41% 30% 37% 11% 0% 23% 1.34% 2.06% 1.16% 0% 8% 80 of 5943 employees 68 of 3300 employees 29 of 2500 employees		19 pct pt X^2 = 3.73, df 1 p = 0.05 25 pct pt x^2 = 7.70, df 1 p = 0.006 reference IC vs MC diff at 12 mo: 7 pct pt NS 0.18 pct pt NR 0.9 pct pt NR reference	6 mo (Inc payoff at 6 mo)

Study	Intervention and Comparison	Population and Sample	Effect measure	Reported baseline	Reported effect	Value used in summary	Follow-up time
Author (Year): Olsen 1991 **Study Period:** 1984–1985 **Study Design:** prospective cohort **Design Suitability:** Greatest **Quality of Execution (No of Limitations):** Fair (4) **Evaluation Setting:** Worksites (Dow Chemical in TX) *Note: Also Olsen 1990	**Location:** USA (Texas) Intervention (Smoking Cessation Initiative Program [SCIP]): Smoking cessation program with options from which individuals can choose: Self-help materials + Smoking cessation groups + Social support (buddy) + Reduced out-of-pocket costs for nicotine replacement + Incentives-contests (for cessation) **Comparison:** Participants compared to non-participants	N (worksites): NR Self-reported smokers identified at baseline survey or registration Pd CIP Non-part 84–85 1113 1204 1989 responders: 679 577 % of eligible: 61.9% 50.2%	1) Self-reported smoking cessation of 5 years duration with biochemical verification at f/u SCIP participants Nonparticipants 2) Self-reported tobacco use (includes smokeless tobacco) cessation of 5 years duration SCIP participants Nonparticipants 3) Participation rates	0% 0% 0% 0% 1113 of 2317 (48%) smokers registered	7.5% 2.8%1 0.2% 4.4% Drop outs early: 323 (29%) late: 338 (30.3%)	4.7 pct points NR 5.8 pct points X^2 = 28.3, df NR p<0.01 19% of eligible smokers	4 years 4 years
Author (Year): Salina 1994 **Study Period:** 1987–1988 **Study Design:** group randomized trial **Design Suitability:** Greatest **Quality of Execution (No of Limitations):** Fair (4) **Evaluation Setting:** Worksites *Note: Also Jason	**Location:** USA (Chicago, IL) **Intervention:** Smoking cessation media series + Client education-self help + Smoking cessation groups + Incentives-contests (abstinence) **Comparison:** Client education-self help materials and potential exposure to smoking cessation media series. Duration of cessation support groups in the	Recruited companies N = 38 with random assignment to intervention or comparison Arm N Intervention 19 Comparison 19 Smoking employees participating: 850 Arm b/l 24 mo Int NR 173 Comp NR 169 Overall f/u at 24 mo was 81%	1)Self-reported smoking cessation (point abstinence; individual as analysis unit) Baseline (end) 12 mo Intervention Comparison 2)Company mean smoking cessation (point abstinence with persons lost to f/u counted as smokers) Baseline 6 mo Intervention Comparison 3)Self-reported continous smoking cessation	0% 29.1% 0% 23.4% 0% 29% 0% 20%	30.1% 19.5% 26% 16%	10.6 pct pt Significant on random effects probit model 10 pct pt F(1,36) = 6.33 p<0.05	12 mo (24 mo from start) Post (12 mo from start)

Study	Intervention and Comparison	Population and Sample	Effect measure	Reported baseline	Reported effect	Value used in summary	Follow-up time
1989	intervention arm was 12 months		(abstinence) Baseline 6 mo Intervention 0% 12% Comparison 0% 5% 4) Participation rate (of self-reported smokers returning baseline surveys) Enrolled Participated Intervention 61% 83% Comparison 75% 71%		11% 3% Unable to calculate from data reported	8 pct pt (reported as significant) –14 pct pt NR (enrolled)	Post (12 mo from start)
Author (Year): Tanaka 2006 **Study Period:** 1999-2003 **Study Design:** Group nonrandomized trial **Design Suitability:** Greatest **Quality of Execution (No of Limitations):** Fair (4) **Evaluation Setting:** Worksite (recruited worksites of 500-1000 employees)	Location: Japan Intervention: Worksite smoking cessation program with Client education (materials) + Counseling + NRT + Worksite smoking restrictions (designated areas) + Incentive award lottery for abstaining from tobacco use Comparison Usual care Workers in both groups received annual occupational health check-ups	Recruited workers who were smokers at baseline and who remained with the worksite for the 36 month intervention and observation period Worksites were assigned to condition Condition Nsites Inter 6 Comp 6 Recruited Workers Grp Bsline 3yr end Intr 1382 1017(74%) Cmp1736 1290(74%)	1) Self-reported smoking cessation (point abstinence) at end of study (36m) Baseline 24m Intervention 0% 7.85% Comparison 0% 7.11% 2) Participation rate for the intervention among study baseline smokers in the intervention worksites	36m 12.1% 9.4%	2.7 pct points p=0.021 (95%CI 0.01,5.3) Stepwise multiple logistic regression analysis OR 1.36 (95%CI 1.04, 1.78) 12.3%	up to 36 months
Author (Year): Windsor 1989 **Study Period:** 1983–1985 **Study Design:** individual randomized	Location: USA (Birmingham, AL) Intervention (4 study arms) 1) Client education self-help materials + Counseling (20 min individual) +	Smokers, employees of UAB N = 1920 N = 378 participants Arm N participants 1 94 2 94	1)Self-reported continous smoking cessation (abstinence) with biochemical verification Baseline 6 mo Client edu+Couns+Social+Inc 0% 12% Client edu+Incentives 0% 8.5%		10% 5%	4 pct points p<0.05 –1 pct points	12 mo

Study	Intervention and Comparison	Population and Sample	Effect measure	Reported baseline	Reported effect	Value used in summary	Follow-up time
trial **Design Suitability:** Greatest **Quality of Execution (No of Limitations):** Fair (2) **Evaluation Setting:** Worksite (University of Alabama at Birmingham) Note: Also Windsor 1988	Social support (buddy system) 2) Client education self-help + Incentives (for cessation—$25 at 6 weeks and $25 at 6 months) 3) Client education self-help + Counseling + Social support + Incentives (for cessation) Comparison: 4) Client education self-help materials only	3 95 4 95 Smokers lost to f/u counted as smoking	Client edu+Couns+Social Client edu self-help only 2)Participation rates (of eligible smokers) Note: Individuals were randomized after enrollment, so this study was unable to evaluate differences in participation by the presence or absence of incentives	0% 20% 0% 7%	18% 6%	NS 12 pct points p<0.05 reference Overall: N = 378 of 1920 (19.7%) smokers	
Author (Year): Volpp 2009 **Study Period:** 2005-2006 **Study Design:** individual randomized trial **Design Suitability:** Greatest **Quality of Execution (No of Limitations):** Good (1) **Evaluation Setting:** Worksites (GE facilities nation-wide)	**Location:** USA **Intervention:** Client education + Incentives (for participation in smoking cessation programs [$100] and for biochemically confirmed abstinence at 6months [$250] and for continued abstinence[$400] plus smaller incentives for interviews [$20] and submission of verification samples [$25]) **Comparison:** Client education about community cessation support options Note: Employees were	Recruited, adult employees interested in participating in a smoking cessation study N worksites: Not reported Recruited adults were randomly assigned to condition Group Nbsline 12m Inter 436 314(72%) Comp 442 336(76%)	1) Biochemically confirmed abstinence: Continued abstinence at 15m or 18m follow-up among participants who had quit by 3m or 6m and remained abstinent through 9-12m assessments Intervention Comparison 2) Rate of participation in a smoking cessation program Intervention Comparison	Baseline 0% 0% Participated 67 (15.4%) 24 (5.4%) p<0.001	15m or 18m 41 (9.4%) 16 (3.6%) Completed 10.8% 2.5% p<0.001	5.8 pct points (95%CI 2.6, 9.0) p<0.001 Adjusted OR cessation = 3.16 (95%CI 1.88, 5.32) Participated; 10 pct points Completed 8.3 pct pts	15m or 18m

Study	Intervention and Comparison	Population and Sample	Effect measure	Reported baseline	Reported effect	Value used in summary	Follow-up time
	informed of their existing cessation health plan benefits						

Abbreviations

b/l, baseline

CI, confidence interval

Cigs, cigarettes

Comp, comparison

Compt, competition(s)

Couns, counseling

CV, cardiovascular

Edu, education

f/u, follow-up

HRA, health risk assessment

IC, incentives condition

Int, intervention

MC, multi-component

Mo, month(s)

N, sample size

NR, not reported

NS, nonsignificant

pct pt, percentage point(s)

Pd, period

SCIP, Smoking Cessation Initiative Program

UC, usual care

Yr, year(s)