

## **SUPPLEMENTARY MATERIALS**

Peer Effects in Smoking Cessation: An Instrumental Variables Analysis of a Worksite

Intervention in Thailand

**Table A1: Crosswalk of randomization groups and intervention components**

#	Randomization group	Intervention Component				
		Usual care	Deposit	\$20 bonus	\$40 bonus	Team
1	Control	✓				
2	\$20 individual bonus	✓		✓		
3	\$40 individual bonus	✓			✓	
4	Team bonus	✓			✓	✓
5	Deposits	✓	✓			
6	Deposits plus teammate	✓	✓			✓
7	Deposits plus \$20 individual bonus	✓	✓	✓		
8	Deposits plus \$40 individual bonus	✓	✓		✓	
9	Deposits plus team bonus	✓	✓		✓	✓

Note: Usual care consisted of brief group counseling and a text messaging program for smoking cessation.

**Table A2: Abstinence status at 3 months and 12 months (main analytic sample)**

	Abstained at 12 months	Smoked at 12 months	<b>Total</b>
Abstained at 3 months	222 (63.79%)	126 (36.21%)	348
Smoked at 3 months	110 (4.46%)	1365 (92.54)	1475
<b>Total</b>	323 (18.21%)	1491 (81.79%)	1823

**Table A3. Baseline characteristics among participants included and excluded from analytic sample**

	(1) Included (n = 1,823)	(2) Excluded (n = 635)	Normalized difference (1) – (2)
<i>Panel A. Sociodemographic characteristics</i>			
Age (%)			
18-25	363 (19.9%)	147 (23.2%)	-0.079
26-35	734 (40.3%)	227 (35.8%)	0.093
36-45	500 (27.4%)	127 (27.1%)	0.0077
46+	226 (12.4%)	89 (14.0%)	-0.048
Male (%)	1776 (97.4%)	613 (96.5%)	0.052
Mean household income per capita in \$100s (SD)	3.0 (1.8)	3.0 (1.8)	
Education level			
0-3 years	49 (2.7%)	44 (6.9%)	-0.20
4-6 years	403 (22.1%)	189 (29.8%)	-0.18
7-12 years	1052 (57.7%)	315 (49.6%)	0.16
13+ years	319 (17.5%)	87 (13.7%)	0.10
Married (%)	1305 (71.6%)	421 (66.3%)	0.11
Any children (%)	878 (48.2%)	255 (40.2%)	0.16
Place of childhood (%)			
Urban Thailand	436 (23.9%)	132 (20.8%)	0.075
Rural Thailand	1183 (64.9%)	339 (53.4%)	0.24
Foreign country	204 (11.2%)	164 (25.8%)	-0.38
<i>Panel B. Smoking characteristics</i>			
Pre-trial cigarettes per day, mean (SD)	7.8 (5.8)	7.1 (5.8)	0.12
Pre-trial nicotine dependent (%)	206 (11.3%)	68 (10.7%)	0.019
No. past quit attempts, mean (SD)	1.9 (2.3)	1.9 (2.4)	-0.030
No. years since initiated smoking, mean (SD)	15.6 (9.6)	15.5 (8.9)	0.013
Want to quit within 3 months (%)	1083 (59.4%)	387 (60.9%)	-0.031
Quit at 3-month follow-up (%)	348 (19.1%)	134 (21.1%)	-0.050
Quit at 12-month follow-up (%)	332 (18.2%)	135 (21.3%)	-0.077
<i>Panel C. Friend network characteristics</i>			
Number of friends reported at baseline, mean (SD)	3.8 (1.5)	0.9 (1.3)	2.1
Number of reciprocal friends at baseline, mean (SD)	1.00 (1.1)	0.26 (0.6)	0.90
Number of times listed as friend, mean (SD)	3.0 (2.5)	1.1 (1.3)	0.98
Number of excluded friends in network (SD)	8.4 (5.8)	N/A	N/A
<i>Panel D. Worksite characteristics</i>			
Number of employees at worksite, mean (SD)	950 (920)	1300 (1000)	-0.378
Number of smokers per worksite, mean (SD)	290 (280)	210 (237.5)	-0.058

*Notes:* The analytic sample is restricted to enrollees who reported having at least one friend at baseline and whose friend(s) had at least one non-overlapping friend with ego. The third column presents normalized differences in means for each variable between the included and excluded sample of all enrollees.

**Table A4. Main coefficients from fully adjusted reduced-form and first-stage regressions (main analytic sample)**

<i>Independent variable</i>	(1)		(2)	
	Probability of ego abstaining (Reduced form)		Mean count of abstainers in ego's network (First stage)	
	3 months	12 months	3 months	12 months
Mean count of abstainers in alter's network	0.066* (0.033)	0.064** (0.030)	0.184** (0.063)	0.114** (0.042)
Number of observations	1821	1821	1821	1821
Number of clusters	100	100	100	100

*Notes:* The reduced form coefficients (Column 1) are estimated from the probit regression of the IV on the probability of ego abstaining. The first stage coefficients (Column 2) are estimated from the OLS regression of the IV on the mean count of abstainers in ego's network. In both specifications, the IV is the mean count of abstainers in alter's friend network that do not overlap with ego's friends (i.e., alters' excluded friends). All regressions control for ego's sociodemographic and smoking characteristics, worksite variables, the size of ego's friend network, and treatment arm. Standard errors in parentheses are clustered at the worksite level. \* p< 0.05, \*\* p<0.01, \*\*\* p<0.001

**Table A5. Marginal effects from linear probability model (main analytic sample)**

	Unadjusted		Partially adjusted		Fully adjusted	
	OLS	2SLS-IV	OLS	2SLS-IV	OLS	2SLS-IV
<i>Panel A: Smoking abstinence at 3 months</i>						
Count of ego's friends who abstained (percentage point change)	0.129*** (0.018)	0.338* (0.132)	0.124*** (0.018)	0.354** (0.134)	0.115*** (0.018)	0.359* (0.152)
Adjusted-R <sub>2</sub>	0.051	--	0.082	--	0.085	--
Montiel-Pflueger Effective F-statistic	--	10.02	--	9.643	--	8.943
P-value from AR weak-IV-robust test	--	0.0063	--	0.0059	--	0.0121
<i>Panel B: Smoking abstinence at 12 months</i>						
Count of ego's friends who abstained (percentage point change)	0.102*** (0.015)	0.491* (0.197)	0.090*** (0.015)	0.494* (0.209)	0.081*** (0.016)	0.563* (0.282)
Adjusted-R <sub>2</sub>	0.037	--	0.065	--	0.071	--
Montiel-Pflueger Effective F-statistic	--	10.88	--	10.99	--	7.539
P-value from AR weak-IV-robust test	--	0.0018	--	0.0029	--	0.0100
<i>Controls</i>						
Sociodemographics	N	N	Y	Y	Y	Y
Smoking characteristics	N	N	Y	Y	Y	Y
Trial variables	N	N	N	N	Y	Y
<i>Number of observations</i>	1,823	1,823	1,821	1,821	1,821	1,821
<i>Number of clusters</i>	100	100	100	100	100	100

*Notes:* Table displays marginal effects from OLS and instrumental variables (2SLS) regressions of ego's abstinence on the count of ego's friends who abstained at 3 months (panel A) and 12 months (panel B). In the IV models, the count of ego's friends who abstained is instrumented using the mean count of abstainers among all non-overlapping friends of ego's friends. All regressions include controls for treatment arm and the size of ego's friend network. Standard errors in parentheses are clustered at the company level. \* p< 0.05, \*\* p<0.01, \*\*\* p<0.001

**Table A6. Marginal effects from IV-probit model (all enrolled employees)**

	Unadjusted		Partially adjusted		Fully adjusted	
	OLS	2SLS-IV	OLS	2SLS-IV	OLS	2SLS-IV
<i>Panel A: Smoking abstinence at 3 months</i>						
Count of ego's friends who abstained (percentage point change)	0.108*** (0.013)	0.228*** (0.065)	0.093*** (0.048)	0.245*** (0.058)	0.096*** (0.014)	0.257*** (0.060)
Pseudo-R <sub>2</sub>	0.046	--	0.084	--	0.090	--
Montiel-Pflueger Effective F-statistic	--	14.88	--	14.30	--	13.34
P-value from AR weak-IV-robust test	--	0.0070	--	0.0039	--	0.0042
<i>Panel B: Smoking abstinence at 12 months</i>						
Count of ego's friends who abstained (percentage point change)	0.103*** (0.013)	0.245*** (0.070)	0.083*** (0.012)	0.281*** (0.072)	0.076*** (0.012)	0.305*** (0.079)
Pseudo-R <sub>2</sub>	0.041	--	0.079	--	0.084	--
Montiel-Pflueger Effective F-statistic	--	16.19	--	17.23	--	12.95
P-value from AR weak-IV-robust test	--	0.0054	--	0.0050	--	0.0112
<i>Controls</i>						
Sociodemographics	N	N	Y	Y	Y	Y
Smoking characteristics	N	N	Y	Y	Y	Y
Trial variables	N	N	N	N	Y	Y
<i>Number of observations</i>	2,458	2,106	2,455	2,104	2,455	2,104
<i>Number of clusters</i>	101	100	101	100	101	100

*Notes:* Table displays marginal effects from probit and instrumental variables (IV) regressions of ego's abstinence on the count of ego's friends who abstained at 3 months (panel A) and 12 months (panel B). The estimation sample includes all enrollees in the intervention. In the IV models, the count of ego's friends who abstained is instrumented using the mean count of abstainers among all non-overlapping friends of ego's friends. All regressions include controls for treatment arm and the size of ego's friend network. Standard errors in parentheses are clustered at the company level. \* p< 0.05, \*\* p<0.01, \*\*\* p<0.001

**Table A7. First-stage regressions for fully adjusted IV model (main analytic sample)**

	Number of ego's friends who abstained (3 mo.)		Number of ego's friends who abstained (12 mo.)	
<i>Instrument</i>				
Mean count of abstainers in alter's network	0.184**	(0.063)	0.114**	(0.042)
<i>Intervention arm (ref. group: control arm)</i>				
Small individual bonus	0.127	(0.113)	0.121	(0.100)
Large individual bonus	0.080	(0.107)	0.142	(0.093)
Team bonus	0.048	(0.135)	0.111	(0.115)
Deposit	0.112	(0.154)	0.042	(0.128)
Deposit + teammate	-0.004	(0.120)	0.038	(0.108)
Deposit + small individual bonus	0.073	(0.103)	0.035	(0.104)
Deposit + large individual bonus	0.236	(0.148)	0.241*	(0.098)
Deposit + team bonus	0.432***	(0.127)	0.222*	(0.102)
<i>Individual characteristics</i>				
Size of ego's network	0.117***	(0.016)	0.111***	(0.014)
<i>Age (ref. group: 18 – 25)</i>				
26-35	0.032	(0.050)	0.072	(0.042)
36-45	0.054	(0.089)	0.153	(0.089)
46+	0.062	(0.128)	0.121	(0.131)
Male	-0.382	(0.201)	-0.455**	(0.163)
Mean household income per capita	0.004	(0.010)	0.004	(0.010)
<i>Education level (ref. group: 1-3 years)</i>				
4-6 years	-0.124	(0.089)	-0.179*	(0.076)
7-12 years	-0.118	(0.093)	-0.119	(0.078)
13+ years	-0.116	(0.099)	-0.125	(0.038)
Married	0.046	(0.037)	0.056	(0.038)
Any children	-0.030	(0.033)	-0.007	(0.038)
<i>Place of childhood (ref. group: urban Thailand)</i>				
Rural Thailand	0.052	(0.037)	0.040	(0.036)
Foreign country	-0.067	(0.088)	0.048	(0.103)
Pre-trial cigarettes per day	-0.006*	(0.003)	-0.004	(0.003)
Pre-trial nicotine dependent	-0.018	(0.048)	-0.018	(0.048)
Number of past quit attempts	-0.001	(0.004)	-0.007	(0.006)
Number of years since initiated smoking	-0.004	(0.007)	-0.003	(0.004)
Want to quit within 3 months	0.015	(0.037)	0.065	(0.036)
<i>Workplace characteristics</i>				
No. employees at worksite	0.000	(0.000)	0.000	(0.000)
No. smokers per worksite	0.000	(0.000)	0.000	(0.000)
No. intervention problems	0.021	(0.023)	-0.014	(0.022)
Field team B	-0.254***	(0.069)	-0.243***	(0.060)
<i>First-stage F-statistic for weak identification</i>				
	8.41		7.47	
<i>Shea partial R<sub>2</sub></i>				
	0.0093		0.0040	

Notes: Table displays all estimated coefficients from the regression of the mean count of abstainers in alter's network on the number of ego's friends who abstained, among the main analytic sample (n = 1,821 at 100 workplaces). Standard errors in parentheses are clustered at the worksite level.

\* p< 0.05, \*\* p<0.01, \*\*\* p<0.001

**Table A8. All coefficient estimates for fully adjusted IV models (main analytic sample)**

	(1)		(2)	
	Ego abstained at 3 months		Ego abstained at 12 months	
<i>Number of ego's friends who quit</i>	0.2673***	(0.0680)	0.3390***	0.0674
<i>Intervention arm (ref. group: control arm)</i>				
Small individual bonus	-0.0043	(0.0309)	-0.160	(0.0317)
Large individual bonus	0.0342	(0.0251)	0.0228	(0.0418)
Team bonus	0.0039	(0.0207)	-0.0254	(0.0312)
Deposit	-0.0315	(0.0258)	-0.0024	(0.0311)
Deposit + teammate	0.0167	(0.0190)	0.0038	(0.3311)
Deposit + small individual bonus	-0.0173	(0.0233)	0.0055	(0.0308)
Deposit + large individual bonus	-0.0017	(0.0355)	-0.0317	(0.0424)
Deposit + team bonus	-0.0703	(0.0415)	-0.0453	(0.0373)
<i>Individual characteristics</i>				
Size of ego's network	-0.0324**	(0.0096)	-0.0372***	(0.0092)
<i>Age (ref. group: 18 – 25)</i>				
26-35	-0.0090	(0.0231)	0.0099	(0.0277)
36-45	0.0162	(0.0358)	0.0030	(0.0436)
46+	0.0435	(0.0605)	0.0322	(0.0162)
Male	0.0839**	(0.0305)	0.0834	(0.0578)
Mean household income per capita	0.0013	(0.0027)	0.0065	(0.0047)
<i>Education level (ref. group: 1-3 years)</i>				
4-6 years	-0.0279	(0.0573)	0.0042	(0.0532)
7-12 years	0.0157	(0.0565)	0.0121	(0.0466)
13+ years	0.0759	(0.0556)	0.0322	(0.0471)
Married	0.0156	(0.0202)	-0.0044	(0.0170)
Any children	0.0293	(0.0161)	0.0320	(0.0172)
<i>Place of childhood (ref. group: urban Thailand)</i>				
Rural Thailand	0.0117	(0.0211)	-0.004	(0.0170)
Foreign country	0.0573	(0.0321)	0.0222	(0.0383)
Pre-trial cigarettes per day	-0.0061**	(0.0020)	-0.0029	(0.0260)
Pre-trial nicotine dependent	0.0374	(0.0276)	0.0243	(0.0260)
No. past quit attempts	0.0033	(0.0028)	0.0055	(0.0030)
No. years since initiated smoking	0.0009	(0.0017)	0.0011	(0.0016)
Want to quit within 3 months	0.0628**	(0.0189)	0.0321	(0.0226)
<i>Trial characteristics</i>				
No. employees at worksite	0.0000	(0.0000)	0.0000	(0.0000)
No. smokers per worksite	0.0000	(0.0001)	0.0000	(0.0000)
No. intervention problems	-0.0023	(0.0048)	-0.0018	(0.0067)
Field team B	-0.0023	(0.0322)	0.0141	(0.0374)
<i>Number of observations</i>	1821		1821	
<i>Number of clusters</i>	100		100	

Notes: The main independent variable is the number of ego's friends who abstained from smoking at the 3- and 12-month endpoints, instrumented by the mean number of alter's friends who abstained at 3- and 12-months (columns 1 and 2, respectively). Models are estimated on the main sample of intervention enrollees only. Standard errors in parentheses are clustered at the worksite level. \* p< 0.05, \*\* p<0.01, \*\*\* p<0.001



**Table A9. Baseline characteristics for ego, by dichotomized instrument at 12-months**

	Value of dichotomized IV		Difference in means: (2) – (1)
	Z = 0	Z = 1	
<i>Socioeconomic and demographic characteristics</i>			
Age	33.1 (8.84)	34.8 (8.94)	1.726***
Male	96.9	98.0	1.06
Mean household income per capita in \$100s (SD)	2.96 (1.76)	3.07 (1.93)	0.119
Education level			
0-3 years	2.56	2.82	0.266
4-6 years	22.8	21.4	-1.46
7-12 years	58.6	56.7	-1.91
13+ years	16.0	19.1	3.10
Married	69.7	73.6	3.84
Any children	47.7	48.7	1.05
Place of childhood			
Urban Thailand	24.4	23.4	-1.02
Rural Thailand	62.0	67.9	5.86**
Foreign country	13.5	8.70	4.84**
<i>Smoking characteristics</i>			
Pre-trial cigarettes per day	7.43 (5.82)	8.27 (5.76)	0.839**
Pre-trial nicotine dependent	12.2	10.4	-1.76
Number of past quit attempts	1.90 (2.39)	1.96 (2.18)	0.061
Number of years since initiated smoking	14.8 (8.89)	16.1 (8.93)	1.32**
Want to quit within 3 months	58.5	60.3	1.81

*Notes:* Columns 1 and 2 present means and standard deviations (in parentheses) of each variable, stratified by a binarized version of the instrument. The binary instrument takes on a value of 1 if any member of alter's network (excluding ego and ego's mutual friends) abstained at 3 months, and a value of 0 otherwise. The final column reports the difference in means between values of the dichotomized instrument. \* p< 0.05, \*\* p<0.01, \*\*\* p<0.001