



## A cross-sectional national survey to explore the relationship between smoking and political abstention: Evidence of social mistrust as a mediator

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### ABSTRACT

**Rationale:** Smoking prevalence is well known to vary socioeconomically but has been less studied in relation to political participation. Growing evidence suggests that health disparities and political nonparticipation are intertwined, but the underlying mechanism is unclear.

**Objective:** We investigated the relationship between smoking and voter registration, testing various forms of trust as possible mediators, in U.S. national survey data collected around the 2012 presidential election.

**Methods:** A random half ( $n = 9757$ ) of adults who completed The Attitudes and Behaviors Survey on Health (TABs) in 2012 (response rate was 58.4% for landline and 24.3% for cell phone) also answered a section on voter registration, voting behavior, and trust in people and selected institutions. Multivariable logistic regression was used to examine the association between smoking and registering to vote and potential mediation by trust in people and various institutions, adjusted for covariates known to be associated with both. Analyses used design-based methods with weights to account for sampling probabilities, nonresponse, and calibration to the U.S. adult population in 2012.

**Results:** Compared with nonsmokers, daily smokers had significantly lower adjusted odds of being registered to vote (aOR: 0.33, 95% CI: 0.21–0.52) and higher adjusted odds of having low trust in people (aOR: 2.50, 95% CI: 1.29–4.83). Low trust in people predicted lower odds of registering to vote (aOR: 0.55, 95% CI: 0.36 to 0.84) and partially mediated the smoking-registration relationship.

**Conclusion:** Lower electoral participation among daily smokers is partly attributable to lower trust in people, a factor that could also affect willingness to use cessation support resources such as quitlines. Low trust and low political participation among daily smokers may have important political and public health consequences.

### 1. Introduction

Growing evidence suggests connections between health status and political participation (Rodgers et al., 2019). Poor physical and perceived health is consistently related to lower rates of voting at both the individual level (Burden et al., 2017; Pacheco & Fletcher, 2015) and the aggregate state level, both in the U.S. (Blakely et al., 2001) and worldwide (Denny & Doyle, 2007; Söderlund & Rapeli, 2015). At least one health risk behavior, smoking, is associated with political inactivity, e.g., not belonging to or attending activities in political parties and organizations (Lindström et al., 2003), and abstention from electoral democracy (Albright et al., 2015; Denny & Doyle, 2007; Kelleher et al., 2002). The mechanisms and public health implications have not been

investigated. The current study examines the role of trust in the smoking-nonvoting relationship.

Generalized trust in people (“horizontal trust” or “cognitive social capital”) and trust in institutions (“vertical trust” in government, police, justice or healthcare systems, etc.) are associated with health-related behaviors, including smoking (Lindström & Janson, 2007). Two Swedish studies found that daily smokers, compared to nonsmokers, tended to have lower levels of trust in government, people in general (Lindström, 2009), and the healthcare system (Lindström & Janson, 2007). In a study among an Asian population, lower social trust was related to greater probability of smoking, particularly among women (Chuang & Chuang, 2008). Being a smoker has also been associated with living in a community where residents report lower levels of trust and safety

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(Siahpush et al., 2006). Low trust in people may lead to less civic participation and withdrawal from sociopolitical life (Hooghe & Marien, 2013; Oskooii, 2016). People who feel marginalized or discriminated against by society tend to view politics pessimistically and are less likely to engage in political activities, perhaps because they internalize negative social evaluations of themselves, have less sense of belonging, and believe they are incapable of making social and political changes (Oskooii, 2016).

Taken together, these findings suggest linkages between smoking behavior and lower levels of social trust, and between mistrust and lower political participation, but the three-way relationship remains unclear. The current study analyzed data from a national U.S. survey, with three aims: 1) to test the relationship between smoking status and being registered to vote, a voting precursor that may reflect more stable attitudes and motivations than the act of voting in specific elections; 2) to determine whether lack of trust in people or institutions partly mediates the relationship of smoking and voter registration, and 3) to consider theoretical and practical implications of these findings.

## 2. Methods

### 2.1. Participants and procedures

We used data from The Attitudes and Behaviors Survey on Health (TABS), which interviewed 14,998 Colorado adults and 3230 U.S. residents outside Colorado by phone between October 1, 2012 and February 11, 2013. Response rates were 58.4% (landline) and 24.3% (cell phone). The Colorado portion of the probability sample used a two-stage, stratified cluster design; the national sample used simple random sampling. The current study population comprises 9757 adults (2857 from outside Colorado, 6900 from Colorado) who were randomly selected to answer questions about voting and trust near the end of the interview.

### 2.2. Measures

The primary outcome variable was voter-registration status; actual voting behavior was also collected. Unregistered and nonvoting respondents were asked open-endedly for up to three main reasons for not having registered/voted. The primary independent variable was smoking status (daily, nondaily, or nonsmoker).

General trust in people, or social trust, was measured with a widely used binary item,<sup>1</sup> whether “most people can be trusted” (coded as “1”, high trust) or “you can’t be too careful in dealing with people” (coded as “0”, low trust). Participants also rated their trust (“a great deal”, “a fair amount”, “not very much”, “no trust at all”) in government, police, the justice system, banks, major business, small business, and health systems. Responses were recoded into a binary variable for each institution. “A great deal” or “a fair amount” was coded as “1” representing high trust, whereas “not very much” or “no trust at all” was coded as “0” representing low trust.

Potential covariates were chosen *a priori* based on reported associations with smoking or voting (Albright et al., 2015; Barbeau et al., 2004; Hiscock et al., 2012; Lindström et al., 2000), which included sex, age, race/ethnicity, education, employment status, marital status, household income relative to the federal poverty level (FPL), self-reported general health status, and health insurance status.

### 2.3. Statistical analysis

We used multivariable logistic regression to examine associations between smoking and voter registration, controlling for the above

covariates known to be associated with both variables. Mediation analysis was conducted using the SAS CAUSALMED procedure to estimate direct and indirect effects of smoking on voter registration and actual voting through trust variables. Analyses used design-based methods with weights to account for sampling probabilities, nonresponse, and calibration of the sample to the U.S. adult population in 2012. Item-missing values of six socioeconomic variables, including education (n = 1084, 6.0% missing), employment status (n = 832, 4.6% missing), marital status (n = 873, 4.8% missing), household income (n = 4342, 23.8% missing), health insurance status (n = 2063, 11.3% missing), and self-reported health status (n = 997; 5.5% missing), were imputed (PROC MI, SAS v. 9.4) using a fully conditional specification (FCS) method based on the conditional probability distributions. The predictors for imputation were age, sex, and ethnicity.

## 3. Results

Demographics of the survey respondents were summarized in Table 1. Because the majority of the respondents were from the state of Colorado, we weighted the sample to make it representative of the U.S. population. Daily smoking prevalence was 15.2% and nondaily smoking was 4.6%, which were comparable to the national rate of current adult tobacco users—20.8%. Large majorities of U.S. adults in 2012 expressed *high* trust in police (81.1%) and small businesses (89.9%), but nearly half or more expressed *low* trust in government (46.0%), major business (51.1%), and people in general (59.8%). About three-fourths (73.5%) of adults voted in the 2012 presidential election; 5.4% were registered but did not vote, 18.6% were not registered, and 2.6% had unknown voting status.

Non-registration was significantly associated with most demographic and health-related factors. Males were less likely than women to register to vote (aOR: 0.61, 95% CI: 0.45 to 0.83). Young adults (aged 18–24) were much less likely to register than people aged 45–64 (aOR: 3.03, 95% CI: 1.83 to 5.01) or 65 and older (aOR: 4.24, 95% CI: 2.32 to 7.75). Single participants were less likely than married participants to be registered to vote (aOR: 0.54, 95% CI: 0.37 to 0.80). Hispanics (aOR: 0.24, 95% CI: 0.15 to 0.37) and Asian Americans (aOR: 0.25, 95% CI: 0.13 to 0.48) were less likely to be registered than whites. Having less than high school education, being unemployed, having household income <100% of the federal poverty level, self-reporting fair or poor general health, and not having health insurance were less likely to register to vote compared to their counterparts (Table 2a). Non-registration was also associated with low trust in people, in police, in the justice system, and in small business.

In bivariate logistic regression, daily smokers (15.2% of adults) were about one-fourth as likely as nonsmokers (OR: 0.25, 95% CI: 0.17 to 0.36) to be registered to vote. Adjusted for covariates, daily smokers were one-third as likely as nonsmokers to be registered (aOR: 0.33, 95% CI: 0.21–0.52). Registration among nondaily smokers (4.6% of adults) did not differ significantly from that of nonsmokers (aOR: 1.04, 95% CI: 0.43–2.55).

In multivariate logistic regression models predicting each bivariate-significant trust factor (Table 3), daily smokers were more likely than nonsmokers to express low trust in people (aOR: 2.50, 95% CI: 1.29–4.83), the justice system (aOR: 1.88, 95% CI: 1.08–3.25), and healthcare systems (aOR: 1.79, 95% CI: 1.01–3.17). Nondaily smokers were more likely than nonsmokers to express low trust in police (aOR: 2.90, 95% CI: 1.89 to 4.44), the justice system (aOR: 1.99, 95% CI: 1.38 to 2.88), and government (aOR: 1.45, 95% CI: 1.02 to 2.07).

In mediation tests, general trust in people, but no other trust variable, was significantly associated with voter registration. Low trust in people was associated with lower adjusted odds of being registered (aOR: 0.55, 95% CI: 0.36 to 0.84). When trust in people was included in the multivariable model of daily smoking and non-registration (Table 2c), the smoking and non-registration aOR increased from 0.33 to 0.35, indicating that low social trust partially mediated the influence

<sup>1</sup> See, e.g., the General Social Survey (<http://gss.norc.org>), the International Social Survey Programme (<http://www.issp.org/menu-top/home/>), and Gallup (<https://news.gallup.com/poll/18802/gallup-panel-people-cant-trusted.aspx>).

**Table 1**

Demographic characteristics, smoking status, trust attitudes, and electoral behaviors of U.S. adults (weighted %) in the 2012 national election, data collected between October 1, 2012 and February 11, 2013.

	n	%
<b>Gender</b>		
Male	4278	48.7
Female	6485	51.3
<b>Age</b>		
18–24	632	13.0
25–44	2252	34.4
45–64	4417	34.4
65+	3462	18.2
<b>Marital Status</b>		
Married/cohabiting	5990	51.4
Divorced/widowed	3154	23.2
Single/never married	1619	25.3
<b>Ethnicity</b>		
White	8426	66.0
Black	598	11.8
Hispanic	1200	15.0
Asian	160	2.5
Other	379	4.7
<b>Education</b>		
<High school graduation, or GED	1029	18.6
High school graduation	1910	25.3
Some college, post-high school	3408	30.2
>College graduation	4416	26.0
<b>Employment Status</b>		
Employed/self-employed	5261	52.0
Homemaker	448	4.6
Retired	3326	18.7
Student	638	11.1
Unemployed	479	5.7
Unable to work/disabled	611	7.8
<b>Income</b>		
<100% FPL	1127	19.7
100% < 200% FPL	2286	24.9
≥200% FPL	7350	55.4
<b>Perceived Health Status</b>		
Fair/poor	1955	24.3
Excellent/very good/good	8808	75.7
<b>Have Health Insurance</b>		
No	1336	20.1
Yes	9427	79.9
<b>Low Trust</b>		
Low trust in people	4753	59.8
Low trust in gov't	4383	46.0
Low trust in police	1253	18.9
Low trust in justice system	3193	38.1
Low trust in banks	3229	34.3
Low trust in major business	4724	51.1
Low trust in small business	528	10.1
Low trust in healthcare	2797	30.3
<b>Smoking Status</b>		
Nonsmoker	8937	80.2
Nondaily smoker	468	4.6
Daily smoker	1315	15.2
<b>Registration and Voting Status</b>		
Not registered to vote	936	18.6
Registered, voting status unknown	241	2.6
Registered, did not vote	237	5.4
Registered and voted	8343	73.5

of smoking on being unregistered. The CAUSALMED procedure, controlling for gender, ethnicity, age, education, and income, showed a significant indirect effect of daily smoking on voter registration through trust in people (aOR: 0.94, 95% CI: 0.87 to 0.99), which explained 2.79% of the negative relationship between smoking and registration to vote.

The same modeling sequence for the relationship of smoking with actual voting produced similar results but without evidence of a trust mediation effect. Daily smokers had significantly lower adjusted odds of voting than nonsmokers (aOR: 0.27, 95% CI: 0.18 to 0.41). In contrast with registration, voting behavior was not associated with general trust

in people and was associated with low trust in small business (aOR: 0.41, 95% CI: 0.21 to 0.78), which was not associated with smoking status. Other trust variables associated with smoking did not predict voting behavior. In post-hoc analysis, no trust measure significantly moderated the smoking relationship with either voter registration or actual voting.

An open-ended question about reasons for not registering to vote yielded largely divergent reasons between daily smokers and nonsmokers. Among nonsmokers, top reasons included “not being a citizen” (23.4%) and “not eligible to vote” (9.1%); among daily smokers, top reasons included “on probation” (16.2%), “don’t care” (14.4%), “make no difference” (8.7%), and “no confidence in government” (8.4%). Similar proportions of both groups cited “no time” as a reason for non-registration (20.3% vs. 20.7%).

#### 4. Discussion

In the 2012 U.S. federal election, daily smokers were substantially and significantly less likely than nonsmokers to be registered to vote and to actually vote, adjusted for sex, age, race/ethnicity, education, employment status, marital status, household income, self-reported general health status, and health insurance status. A lack of generalized trust in people partly mediated the relationship of smoking with being unregistered to vote; no institutional trust variable mediated the association, and no trust variable moderated the association. Results suggest that the relationships between trust variables and registration/voting behaviors are complex. Lack of trust in people only slightly mediated smoking to nonregistration. Other mechanisms remain unclear. The absence of a relationship between voter registration and institutional trust might be because opposite ends of the institutional trust spectrum can theoretically be motivated to engage in elections for different reasons: People with higher levels of institutional trust might participate because they believe the institutions will respond to their wishes and needs, while people with low institutional trust might participate in hopes of changing the institutions.

About one-third of nonregistered nonsmokers cited reasons of ineligibility for nonregistration, while about one-sixth of daily smokers cited political inefficacy, i.e., disbelief that voting matters and that government is trustworthy (Balch, 1974). Political participation and political efficacy are reciprocally influential (Finkel, 1985)—the more pessimistic smokers feel about government and elections, the more they withdraw from the system, excluding their voices from political decisions and compounding their lack of political efficacy. Where this downward spiral bottoms out is unclear.

##### 4.1. Theoretical and practical implications

Disparities in voter registration and voting behavior disadvantage non-participating groups, including smokers, when policy and leadership decisions are being made. Considerable evidence demonstrates that health disparities and disparities in political participation are closely intertwined (Navarro & Shi, 2001). Associations between political participation and health behaviors have received less attention. The current study suggests that daily smokers are more likely to report trust barriers to electoral participation, in addition to structural barriers such as being on probation, inconvenience, and eligibility criteria.

Social withdrawal and isolation have public health consequences. Tobacco control campaigns have made smoking socially unacceptable in many nations, and disapproval tends to diffuse from the behavior to the individuals who smoke. This stigma may at least partly explain smokers’ low trust in people. More generally, perceptions of societal rejection or discrimination have been linked with negative self-evaluation, less sense of belonging and less political efficacy, leading in turn to withdrawal from political activities and not registering to vote (Oskooii, 2016). Disproportionate abstention of smokers from electoral decisions that affect health policy has unknown but presumably negative implications for policymaking by reducing representativeness. Public health

**Table 2**  
Bivariate and adjusted odds of being registered to vote by demographic, smoking, and trust variables, United States, 2012, TABS on health.

	a. Bivariate Models			b. Multivariable Model			c. Multivariable Model (Adding trust in people)		
	OR	95% CI		OR	95% CI		OR	95% CI	
<b>Gender</b> rowhead									
Female	ref	-	-	ref	-	-	ref	-	-
Male	0.61	0.45	0.83	0.59	0.41	0.87	0.58	0.39	0.84
<b>Age (years)</b> rowhead									
18-24	ref	-	-	ref	-	-	ref	-	-
25-44	1.26	0.76	2.07	1.65	0.76	3.61	1.69	0.78	3.64
45-64	3.03	1.83	5.01	3.59	1.50	8.56	3.43	1.45	8.11
65+	4.24	2.32	7.75	4.69	1.62	13.57	4.49	1.51	13.34
<b>Marital Status</b> rowhead									
Married/cohabiting	ref	-	-	ref	-	-	ref	-	-
Divorced/widowed	0.72	0.49	1.06	0.59	0.38	0.92	0.60	0.38	0.94
Single/never married	0.54	0.37	0.80	1.21	0.67	2.19	1.22	0.68	2.19
<b>Ethnicity</b> rowhead									
White	ref	-	-	ref	-	-	ref	-	-
Black	0.99	0.53	1.84	1.45	0.72	2.90	1.46	0.75	2.86
Hispanic	0.24	0.15	0.37	0.36	0.21	0.62	0.37	0.22	0.65
Asian	0.25	0.13	0.48	0.19	0.09	0.42	0.19	0.09	0.43
Other	0.72	0.32	1.63	0.715	0.33	1.57	0.73	0.32	1.67
<b>Education</b> rowhead									
<High school graduation GED	ref	-	-	ref	-	-	ref	-	-
High school graduation	2.23	1.43	3.46	1.85	1.09	3.14	1.86	1.09	3.17
Some college, post-high school	4.13	2.65	6.45	3.63	2.00	6.56	3.41	1.87	6.20
>College graduation	9.62	6.04	15.33	5.38	2.93	9.88	4.79	2.58	8.90
<b>Employment Status</b> rowhead									
Employed/self-employed	ref	-	-	ref	-	-	ref	-	-
Homemaker	0.52	0.29	0.95	0.58	0.30	1.13	0.59	0.3	1.15
Retired	2.03	1.22	3.36	1.30	0.69	2.45	1.32	0.67	2.61
Student	0.93	0.53	1.63	1.47	0.65	3.30	1.40	0.64	3.05
Unemployed	0.42	0.25	0.73	0.80	0.40	1.58	0.84	0.42	1.68
Unable to work/disabled	0.80	0.46	1.40	2.07	0.93	4.58	2.20	0.98	4.95
<b>Income</b> rowhead									
<100% FPL	ref	-	-	ref	-	-	ref	-	-
100% < 200% FPL	1.99	1.30	3.06	1.21	0.7	2.10	1.26	0.73	2.16
≥200% FPL	6.13	4.07	9.24	1.85	1.01	3.39	1.83	1.00	3.34
<b>Perceived Health Status</b> rowhead									
Fair/poor	ref	-	-	ref	-	-	ref	-	-
Excellent/very good/good	2.36	1.68	3.32	1.53	0.96	2.43	1.41	0.89	2.23
<b>Health Insurance</b> rowhead									
Do not have health insurance	ref	-	-	ref	-	-	ref	-	-
Have health insurance	4.24	2.95	6.1	1.48	0.9	2.44	1.50	0.908	2.49
<b>Trust in People</b> rowhead									
High	ref	-	-				ref	-	-
Low	0.33	0.22	0.47				0.55	0.36	0.84
<b>Trust in Government</b> rowhead									
High	ref	-	-						
Low	0.87	0.62	1.20						
<b>Trust in Police</b> rowhead									
High	ref	-	-						
Low	0.43	0.29	0.63						
<b>Trust in Justice System</b> rowhead									
High	ref	-	-						
Low	0.63	0.45	0.88						
<b>Trust in Banks</b> rowhead									
High	ref	-	-						
Low	0.83	0.59	1.15						
<b>Trust in Major Business</b> rowhead									
High	ref	-	-						
Low	0.86	0.62	1.21						
<b>Trust in Small Business</b> rowhead									
High	ref	-	-						
Low	0.33	0.21	0.53						
<b>Trust in Healthcare</b> rowhead									
High	ref	-	-						
Low	1.06	0.75	1.49						
<b>Smoking Status</b> rowhead									
Nonsmokers	ref	-	-	ref	-	-	ref	-	-
Non-daily smokers	0.81	0.37	1.75	1.04	0.43	2.55	1.13	0.46	2.73
Daily smokers	0.25	0.17	0.36	0.33	0.21	0.52	0.35	0.22	0.54

**Table 3**  
Multivariate logistic regressions predicting trust variables, United States, 2012, TABS on health.

IVs	Low Trust in People			Low Trust in Police			Low Trust in Justice System			Low Trust in Healthcare System		
	OR	95% CI		OR	95% CI		OR	95% CI		OR	95% CI	
<b>Age</b>												
18–24	ref	–	–	ref	–	–	ref	–	–	ref	–	–
25–44	1.44	0.79	2.63	0.63	0.33	1.20	0.82	0.46	1.45	1.61	0.93	2.76
45–64	0.90	0.48	1.66	0.36	0.18	0.73	0.86	0.47	1.59	1.22	0.69	2.13
65+	0.84	0.41	1.73	0.23	0.09	0.56	0.86	0.43	1.70	0.90	0.45	1.80
<b>Marital Status</b>												
Married/cohabiting	ref	–	–	ref	–	–	ref	–	–	ref	–	–
Divorced/widowed	1.18	0.87	1.59	1.50	0.99	2.28	1.46	1.10	1.93	1.06	0.78	1.43
Single/never married	1.19	0.82	1.70	1.38	0.88	2.19	1.29	0.87	1.91	0.92	0.64	1.34
<b>Ethnicity</b>												
White	ref	–	–	ref	–	–	ref	–	–	ref	–	–
Black	1.92	1.18	3.13	3.28	2.09	5.14	1.43	0.96	2.13	0.41	0.25	0.68
Hispanic	1.67	1.02	2.73	2.31	1.34	4.01	1.87	1.18	2.95	0.89	0.56	1.41
Asian	1.24	0.68	2.26	1.39	0.61	3.19	0.75	0.38	1.49	0.99	0.50	1.95
Other	1.57	0.84	2.94	1.52	0.73	3.20	1.45	0.82	2.57	1.47	0.82	2.63
<b>Education</b>												
<High school graduation GED	ref	–	–	ref	–	–	ref	–	–	ref	–	–
High school graduation	0.84	0.51	1.37	1.45	0.82	2.57	0.93	0.59	1.45	1.25	0.78	1.98
Some college, post-high school	0.48	0.30	0.79	0.94	0.53	1.68	1.04	0.67	1.60	1.65	1.05	2.60
>College graduation	0.40	0.25	0.65	0.87	0.48	1.56	0.96	0.61	1.50	1.49	0.93	2.39
<b>Employment Status</b>												
Employed/self-employed	ref	–	–	ref	–	–	ref	–	–	ref	–	–
Homemaker	1.36	0.84	2.20	0.84	0.40	1.73	1.37	0.83	2.27	0.89	0.52	1.49
Retired	1.21	0.81	1.81	0.97	0.52	1.81	0.99	0.70	1.42	0.87	0.55	1.38
Student	0.97	0.54	1.73	0.75	0.37	1.54	0.85	0.49	1.46	0.99	0.58	1.67
Unemployed	1.51	0.87	2.61	0.87	0.46	1.64	1.37	0.81	2.30	1.22	0.7	2.13
Unable to work/disabled	2.03	1.16	3.58	0.81	0.40	1.62	0.87	0.52	1.44	1.38	0.82	2.33
<b>Income</b>												
<100% FPL	ref	–	–	ref	–	–	ref	–	–	ref	–	–
100% < 200% FPL	1.28	0.79	2.08	1.07	0.64	1.77	0.91	0.60	1.39	1.02	0.65	1.60
≥200% FPL	0.86	0.54	1.36	0.94	0.54	1.64	0.90	0.59	1.39	1.01	0.65	1.59
<b>Perceived Health Status</b>												
Fair/poor	ref	–	–	ref	–	–	ref	–	–	ref	–	–
Excellent/very good/good	0.52	0.37	0.73	0.54	0.36	0.83	0.75	0.53	1.04	0.84	0.60	1.17
<b>Health Insurance</b>												
Do not have health insurance	ref	–	–	ref	–	–	ref	–	–	ref	–	–
Have health insurance	1.02	0.68	1.56	1.2	0.74	1.95	1.02	0.70	1.50	0.75	0.50	1.11
<b>Smoking Status</b>												
Nonsmokers	ref	–	–	ref	–	–	ref	–	–	ref	–	–
Non-daily smokers	1.42	0.95	2.11	2.90	1.89	4.44	1.99	1.38	2.88	1.03	0.72	1.49
Daily smokers	2.50	1.29	4.83	1.58	0.76	3.30	1.88	1.08	3.25	1.79	1.01	3.17

campaigns should seek better ways to continue denormalizing smoking behavior while reducing stigmatization and reactance among smokers.

Regarding cessation treatment, we wonder whether low social trust among smokers might partly explain challenges of reach and adherence. Engagement through a telephone Quitline, for example, requires sufficient trust in strangers to initiate the call and share personal information with an unseen person. Cessation treatment programs might seek ways to build trust and rapport through communications and initial engagement with smokers.

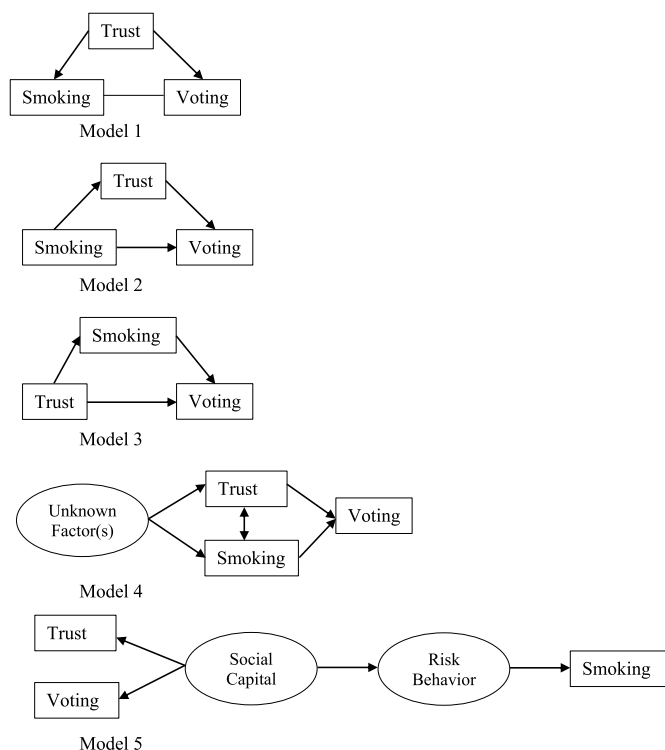
#### 4.2. Strength and limitations

Eligible U.S. voters must register to vote (except in the State of North Dakota) before they are allowed to vote in federal and state elections. As a prerequisite to voting, registration is thus a critical indicator of political participation (Gill et al., 2018; Verba et al., 1995) and is more closely tied to demographic and motivational factors that influence political participation than voting is (Erikson, 1981). Previous studies of the association between smoking and civic engagement have focused on participation in social activities (Lindström et al., 2000, 2003) or voter turnout (Kelleher et al., 2002), mostly in European countries. To our knowledge, the current study is the first U.S. population-based public health study to begin unpacking the relationships among smoking status, generalized trust, and political participation.

The study also has several limitations. Cross-sectional data cannot generate evidence of causality, and our study cannot determine what

causes smoking and electoral participation to correlate. We theorize five possible pathways (Fig. 1). Lack of trust might be responsible for both smoking and electoral non-participation (Model 1 in Fig. 1), possibly with individual moderating factors such as feelings of exclusion, other psychological stressors, or dispositional characteristics such as lack of patience for delayed gratification. Regarding the latter, smoking has been associated with delay-discounting (Reynolds et al., 2004), and nonvoters tend to overestimate the cost of voting and discount its future benefits (Fowler & Kam, 2006). Further research should theoretically identify and investigate potential factors that influence both smoking and voting behaviors.

A second possibility is that smoking causes electoral nonparticipation (the reverse direct sequence is implausible). Our study found that social trust partly mediated such a relationship (Model 2 in Fig. 1), but the effect was small, and other mechanisms are likely responsible if this model is accurate. A third possibility is that people with low interpersonal trust might be more likely than others to start smoking, perhaps in connection with social anxiety, and then smoking and mistrust together reduce political participation (Model 3 in Fig. 1). A fourth possibility is that unknown factors induce both social mistrust and smoking initiation, which in turn reduce political participation (Model 4 in Fig. 1). Finally, research usually conceptualizes civic participation, including voting in presidential elections, as an important component of structural social capital; perhaps social trust and registering to vote/voting behavior indicate social capital as a latent variable, and limited social capital makes health-risk behaviors, such as smoking, more likely (Model 5 in



**Fig. 1.** Theoretical models of the relationship between smoking and voting.

**Fig. 1.** Additional models are conceivable, and theory-based research is needed to clarify these relationships.

It is worth noting that socio-demographic factors are inherently linked with, or even determine the three key constructs in the study—smoking behavior, social trust, and political participation (voting). Smoking is a socially mediated behavior (Lynch & Bonnie, 1994), and gender, education level, and income determine smoking behavior worldwide (Hosseinpoor et al., 2011). Social trust is strongly related to income and social class (Delhey & Newton, 2003). Results from our bivariate and multivariate analyses showed that being Hispanic, having less than high school education, and perceived poorer health status were closely associated with both low trust in people and non-registration to vote. Since the current research focuses on the relationship between smoking, trust, and voting, we controlled for all potentially significant socio-demographic variables. Controlling for these factors, significant associations remained between smoking and low social trust, and between smoking and non-voting. We also conducted stratified analyses of the relationships among smoking, social trust, and registration to vote by age, ethnicity, age, and income level. Results showed that daily smoking was significantly associated with non-registration to vote among both male and female participants, white but not other ethnic groups, age groups younger than 65, and across all income levels. Daily smoking was associated with low social trust among females but not males, whites (marginally) and Hispanics but not other ethnic groups, and people ages 45–64. Low social trust was associated with non-registration in both males and females, white and Black participants, and people ages 18–24. Non-significant associations for certain subgroups are likely due to lack of power to detect small effects, especially for variables with four or five categories. It is also possible that the significant overall mediation effect was mainly driven by white and female participants, although interactions between gender, ethnicity and smoking did not significantly influence trust in people nor voting registration. Nevertheless, the impacts of SES and demographic characteristics on smoking, trust, and voting cannot be ignored, and they may be the underlying causes for this phenomenon. Further studies with adequate power are encouraged to explore the impacts of these

socio-demographic variables on moderating the associations among smoking, social trust, and voting behavior.

The current study controlled for demographic and socioeconomic variables associated with smoking behavior and political participation, but unmeasured factors evidently play important roles in determining the relationship and are worthwhile targets of future research.

Imputation is superior to listwise deletion in our case for the following reasons. First, listwise deletion may decrease statistical power (Raaijmakers, 1999; Lodder, 2013). We imputed these variables to avoid underpowered analysis. Second, listwise deletion may bias parameter estimates (Schafer & Graham, 2002; Wothke, 2000) unless missingness is completely at random, which is unlikely. Third, imputations are created by drawing from iterated multivariate conditional models and can give us a better estimate of the underlying distribution of the data. Imputations are especially useful for large datasets with complex data structures and different patterns of missing. However, it assumes data are missing at random and can be biased if the assumption is violated. We compared results in imputed versus unimputed data and found the same pattern, i.e., a significant indirect effect of smoking on voter registration through trust in people (aOR: 0.93, 95% CI: 0.86 to 0.99). This finding suggests our findings are robust and unlikely to be a result of imputation strategy.

## 5. Conclusions

Daily smokers are less likely to register to vote and to vote. Low social trust partly explains the negative association. Further research should identify underlying mechanisms and potential interventions to reduce this inequity in political participation.

## Statements of ethical approval

The research protocol has been approved by the Colorado Multiple Institutional Review Board (COMIRB): # 05–0785.

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## Author contributions

S. Zhou conceptualized the study, developed the analytic plan and led the writing of the article. Y. Li performed the statistical analysis. A. Levinson contributed to the study design, interpretation of data, and editing of the article. All authors approved the final submitted article.

## Declaration of competing interest

The authors have no conflicts of interest to report.

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