



Gender differences in relationships between social capital and individual smoking and drinking behavior in Taiwan[☆]

Ying-Chih Chuang^{*}, Kun-Yang Chuang

Graduate Institute of Public Health, Taipei Medical University, Taipei, Taiwan

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ABSTRACT

Despite the concept of social capital receiving great attention in the area of health research, few studies have analyzed the differential effects of social capital between genders. This article assesses gender differences in the relationships between social capital and smoking and drinking behavior in Taiwan. Data on individual sociodemographic characteristics, smoking, drinking, and social capital were obtained from the Taiwan Social Change Survey conducted in 1995 and in 2000. The overall response rate was 67%. In total, 3713 women and men aged over 20 years living in 204 neighborhoods were interviewed. Social capital indicators were aggregated at the neighborhood level, and included neighborhood closeness, political influence, social contact, social trust, and social participation. The data were analyzed with multilevel binomial regression models. Gender differences were found in some aspects of social capital. Stronger effects of social trust on smoking were found for women than for men, whereas stronger effects of neighborhood closeness on drinking were found for women than for men. Social participation was positively associated with drinking in both genders. The findings of this study provide new evidence for the differential effects of social capital by gender in Taiwan, suggesting that more studies are needed to understand social capital's effects in Asian societies and the mechanisms by which the effects may vary with gender.

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Introduction

The concept of social capital has received great attention in the area of public health research. Studies have consistently shown that social capital is related to a variety of health behavior and health outcomes including criminal

behavior, mental health, smoking, self-rated health, morbidity, and mortality (DeSilva, Huttly, Harpham, & Kenward, 2007; Kawachi, Kennedy, Lochner, & Prothrow-Stith, 1997; Siahpush et al., 2006; Veenstra et al., 2005). One major cited criticism of prior studies is the lack of examination of differential effects of social capital between genders (Kavanagh, Bentley, Turrell, Broom, & Subramanian, 2006). Most researchers “average” the effects of neighborhood-level variables across individuals, despite some evidence that neighborhood effects may be heterogeneous between women and men (Kavanagh et al., 2006; Stafford, Cummins, Macintyre, Ellaway, & Marmot, 2005). Another criticism is a lack of studies conducted in non-Western societies (DeSilva et al., 2007; Mitchell & Bossert, 2007; Yip et al., 2007). Although a large number of studies have suggested a positive relationship between social capital and individual health, whether social capital has a beneficial impact on

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^{*} Corresponding author. Tel.: +886 2 27361661x6527; fax: +886 2 27396814.

E-mail addresses: yingchih@tmu.edu.tw (Y.-C. Chuang), adinma@tmu.edu.tw (K.-Y. Chuang).

individual health in societies other than the US and European countries remains inconclusive. This study examines whether the effects of social capital on individual smoking and drinking behavior varied by gender in Taiwan.

Similar to other ethnic Chinese societies, the society in Taiwan is founded on human relationships (Hwang, 1987). Social networks composed of immediate and extended families, friends, and neighbors form the basis of Chinese societies. Studies have shown that social contacts generated from the dense social networks in Chinese communities can effectively lessen economic hardships and psychological distress and are major resources that Chinese individuals use to accomplish their personal goals (Liang & Bogat, 1994; Taylor et al., 2004). However, the close interpersonal relationships also impose heavy duties, obligations, and moral standards on individuals, which can confine a person's expressions and liberties (Portes, 1998). Little is known about whether or how much social capital can increase one's health in an ethnic Chinese society. In the last two decades, Taiwan underwent rapid economic growth, with an increase of GDP per capita from US\$2348 in 1980 to US\$14,519 in 2000 and US\$16,030 in 2007. Taiwan thus serves as a good case to examine the health effects of social capital in a society undergoing rapid social transformation. Findings from Taiwan can offer insights into the situations of other countries with similar socioeconomic and cultural backgrounds.

We used smoking and drinking as outcomes of interest because both of these types of behavior are sensitive to the impact of social capital and are prevalent among males in Taiwan (Poortinga, 2006; Siahpush et al., 2006). Similar to other Asian countries, smoking and drinking by male adults in Taiwan are accepted social practices, which serve to establish and maintain interpersonal and social bonds. Offering cigarettes and alcohol to others are common at social gatherings such as parties, weddings, and funerals. On many social occasions, men are expected to exchange cigarettes, help each other to light up cigarettes, pour wine for others, and encourage each other to "bottom up" the wine. On the other hand, turning down offers of cigarettes and alcohol is considered to be rude, which may promote compulsory smoking and drinking behavior in these social contexts. Although smoking and drinking play major roles in social life for men, women are not encouraged to smoke and drink in Taiwan. Women are more likely to reject offers of cigarettes and alcohol without offending others. Although women consistently have lower rates of smoking and drinking than men, the prevalence rates of these behavior are increasing due to greater economic independence and changes in social concepts (Liang, Kuo, & Wang, 2002). The smoking rate of women, in particular, increases from 2.3% to 4.3% between 1990 and 2000 compared to a decreased rate of men from 50% to 43.5%. In the last two decades, rapid socioeconomic changes, such as the massive movement of women into the paid workforce, have altered the roles of women and indirectly promoted female smoking and drinking (Liang et al., 2002). This trend is also reflected in the marketing strategies used by tobacco and alcohol companies, in which liberation, glamour, and elitism are used for the female market (Morrow & Barraclough, 2003a, 2003b).

The concept of social capital

Three major theoretical foundations of social capital are frequently cited in the public health research literature. Putnam (1993, 2000) defined social capital as "features of social organization such as networks, norms and social trust that facilitate coordination and cooperation for mutual benefit". He conducted research in both Italy and the US on the relationships among social relations, civic engagement, and political and economic outcomes. In Italy, he found that regions with higher levels of civic engagement such as newspaper readership, voter turnout, and membership in various associations had better political and economic performances. He later applied the concept of social capital to analyze US society over the past 20 years and found that a decline in civic cultures led to worsened population health (Putnam, 2000, 1993).

Coleman (1988) described social capital as being imbedded in social relationships and serving as resources for people to achieve their interests (Coleman, 1988). Coleman introduced various forms of social capital including (1) obligations, expectations, and trustworthiness that exist in social structures; (2) information channels imbedded in social relationships; and (3) norms and effective sanctions against deviant behavior. Bourdieu (1986), in contrast, introduced three kinds of capital: human capital (i.e., education), cultural capital (i.e., language), and social capital, defined as a form of group resources that accrue to individuals as a result of their membership in social networks (Bourdieu, 1986). He suggested that social capital is often used to obtain human capital and cultural capital, which can raise one's social position and status in a society.

According to reviews of the social capital literature, the major differences among Putnam, Coleman, and Bourdieu lie on the definition of social capital as forms, channels, or contents (Carpiano, 2006). Some researchers suggested that Putnam addressed social capital as trust and reciprocity in social networks that form the basis through which individuals build up and maintain interpersonal connections, while Bourdieu emphasized that social capital refers to the actual resources that are imbedded in social networks (Carpiano, 2006). To better distinguish dimensions of social capital, it has been categorized into cognitive and structural resources (Harpham, Grant, & Thomas, 2002). Cognitive social capital refers to subjective perceptions of the quality of social relationships such as trust, support, norms, and reciprocity, while structural social capital refers to the objective quantity of social relationships and activities such as membership in associational activities (Mitchell & Bossert, 2007). In addition to the cognitive and structural distinctions, some researchers have categorized social capital into bonding, bridging, and linking forms of social capital (Szreter & Woolcock, 2004). Bonding social capital refers to the relationships among members of a network who see themselves as being similar (i.e., kin family networks). Prior studies used personal contacts with neighbors and friends to measure bonding social capital (Rojas & Carlson, 2006). Bridging social capital refers to links across different groups that do not have similar statuses and identities, such as participation in culture diversity clubs or organizations. Linking

social capital points to connections to formal and institutionalized power in a society. Examples of linking social capital with power structures are voting participation and political action (Lofors & Sundquist, 2007). Szreter and Woolcock (2004) argued that three forms of social capital are important to people's health: bonding social capital for interpersonal social contact, bridging social capital for solidarity and mutual respect across different social groups, and linking social capital for trusting relationships across groups with different levels of power.

Gender differences in the relationship between social capital and individual health

There is some evidence that the effects of social capital may vary by gender. For example, Locher et al. (2005) found that when social capital was measured by regular religious participation and trust in a community, it had protective effects on the poor nutritional health for black men; however the same effect was not found for black women (Locher et al., 2005). Another study reported that while social trust had positive effects on the self-rated health of men, neighborhood safety and political participation had positive effects on the self-rated health of women (Kavanagh et al., 2006). Similarly, Ellaway and Macintyre (2007) reported that women and men were influenced by different aspects of social capital. Being involved in church-related activities or other social clubs was associated with a lower waist-hip ratio in women only, whereas men being involved in social clubs was related to a poorer body-mass index (BMI) and systolic blood pressure, but better mental health (Ellaway & Macintyre, 2007). Stafford et al. (2005) also found significant interactions between gender and social capital on individual health. They used trust, integration into the larger society, and participation in left-wing society as proxies for social capital. They found that the magnitude of the relationship between social capital and health was larger for women than for men (Stafford et al., 2005).

The above studies showed inconsistent findings of gender differences in the relationship between social capital and health. Since different geographical scales were used to measure social capital (i.e., individual, neighborhood, county, state), it is not surprising that they reached different conclusions. If neighborhoods were used as the unit of measurement, the influences of social capital should largely depend on the length of exposure and the sensitivity to local environments. Traditionally, women are more likely to spend more time in neighborhoods conducting domestic works such as shopping for groceries near by or taking care of children and the elderly (Kavanagh et al., 2006). Women are also likely to be more capable of creating and maintaining local social networks that connect families and communities, given their social role of interpersonal caring and comforting (Warr, 2006). Therefore, we do expect to see the influences of social capital on smoking and drinking to be greater for women than for men because women are more sensitive to and are more likely to be affected by the behavior, norms, and attitudes related to smoking and drinking in their communities.

Social capital and smoking and drinking behavior

Only a few studies have investigated the influences of social capital on individual smoking and drinking behavior. According to these studies, the possible mechanisms of social capital on smoking and drinking behavior can be via community norms against tobacco and alcohol use, community organization and collective actions to prevent smoking and heavy drinking (i.e., smoking restrictions in local restaurants); cohesive social networks to buffer the adverse effects of stress, and promotion of more rapid diffusion of anti-smoking and anti-heavy drinking messages in communities. Several studies found significant effects of social capital on smoking. Siahpush et al. (2006) found that residing in a community with a higher level of social capital, measured by trust and safety, was related to a higher probability of smoking (Siahpush et al., 2006). Patterson, Eberly, Ding, and Hargreaves (2004) found that when a geographical area was aggregately rated as a cohesive, safe, and good place to live, individuals reported a lower tendency to smoke (Patterson et al., 2004). Greiner, Li, Kawachi, Hunt, and Ahluwalia (2004) found that community rating (i.e., whether the community was rated as a good place to live) was associated with individual smoking (Greiner et al., 2004). In addition, Poortinga found that trust and civic participation each was independently associated with being a smoker (Poortinga, 2006).

Regarding drinking behavior, Godoy et al. (2006) found that increased social capital, measured by exchanging gifts, and help and participation in community work, was associated with fewer instances of drinking alcohol weekly (Godoy et al., 2006). Weitzman and Chen (2005) reported that college-level time committed to volunteering lowered the opportunities for various drinking behavior problems among college students. These results still held up after controlling for individual-level characteristics (Weitzman & Chen, 2005). Poortinga also provided evidence for the effects of social capital on drinking. He found that both individual and community-level social capital were associated with moderate drinking (Poortinga, 2006).

The above studies seem to indicate that smoking behavior is more consistently associated with community cohesion and trust, but not with social participation and community involvement (Greiner et al., 2004; Siahpush et al., 2006). Drinking behavior, on the contrary, is associated with social participation in several studies (Godoy et al., 2006; Lindstrom, 2005). In addition, prior studies have shown that trust and social participation can interactively influence individual smoking and drinking. Lindstrom suggested that alcohol consumption and intermittent smoking were positively associated with social participation but were negatively associated with trust (Lindstrom, 2003, 2005). This phenomenon has been called "the miniaturization of community" because even though a great number of people in the younger generation participate in ideologically more narrowly defined groups and organizations, the number of people who participate in traditional organizations (i.e., church and union) is declining. This shows that the dimensions of social capital may interactively influence smoking and drinking, and high social participation is not necessarily correlated with high trust (Lindstrom, 2003).

This study proposes that gender differences constitute differential social contexts in which influences of social capital on individual smoking and drinking behavior occur. We used indicators of social trust, neighborhood closeness, neighborhood social contact, political influence, and membership in associations to measure social capital. We then investigated whether the effects of social capital on individual smoking and drinking behavior varied by gender in Taiwan.

Methods

Data

The individual-level data were from the 1995 and 2000 Taiwan Social Change Surveys (Chang, 2000; Chiu, 1995). A multistage cluster sampling method was used to select adults 20 years and older for the survey. The data collected from 359 township/districts of Taiwan was divided into ten strata according to geographic location and degree of urbanization. Townships or districts in each stratum were selected by probability proportional to their size (PPS). In each selected township/district, *lis* (a *li* is a neighborhood-level geographical division created by the Taiwan Census Bureau for studying neighborhoods) and villages were selected by PPS, and individuals were randomly selected in *lis* and villages. Data were collected by interpersonal interviews using a structured questionnaire. Interviewers were required to attend a standardized 2-day training workshop before conducting interviews. The overall response rate was 67% after excluding ineligible cases. The major reasons for not completing the interview included an inability to find the person (18.3%) and refusal to participate (11.2%). Ten percent of the cases were rechecked for quality control. This study defined neighborhoods by *li* and village with an average of 2000 people and 874 households per neighborhood. They were created by visible boundaries such as streets and rivers, and to be as homogeneous as possible with population characteristics. Neighborhoods in this study, on an average, had 33.4% residents with less than a middle school education (std = 13.2), 9.3% with a college degree (std = 7.8), 5.9% being single-parent families (std = 2.0), 8.5% older than age 65 (std = 4.1), and 26.9% younger than age 18 (std = 4.5). Participants' reports of social capital indicators were then aggregated to their *lis* and villages to represent neighborhood-level social capital. Only 1% of the respondents were not accurately geocoded to their neighborhoods, resulting in a final sample size of 204 neighborhoods and 3713 people. Informed consent was obtained from each participant. The ethics committee of the National Science Council of Taiwan approved this study.

Measurements

Social capital

Our social capital measurements followed Putnam's conceptualization of social capital, which consists of features such as interpersonal trust, ties of social networks, and social engagement that foster community and social participation. We did not have survey items to cover

Bourdieu's conceptualization in which social capital is defined as the actual or potential resources that inhere within social networks or groups for personal benefits (i.e., informal social control) (Carpiano, 2006). Although the adequate level for analysis of social capital is still being disputed, we adopted the definition of social capital as a property of groups to distinguish this concept from individual-level social support (Kawachi, Kim, Coutts, & Subramanian, 2004). Individual responses for each item of social capital were aggregated to the neighborhood level. Each item was recoded so that a higher value represents a higher level of social capital. An oblique exploratory factor analysis was conducted to examine the dimensions of social capital. Table 1 shows that five factors were extracted based on a scree plot decision and the stipulation that Eigenvalues of retained factors had to exceed 1. We used factor scores of indicators to represent social capital measurements. *Neighborhood closeness* was measured by the indicators: (1) number of neighbors' homes that you regularly visit on a five-point scale; and (2) the feeling that this is a close-knit neighborhood on a four-point scale ($r = .86$). *Political influence* was measured by the indicators: (1) citizens can contribute to local/city policies if they want to; and (2) citizens have influences on improving the society on a six-point scale ($r = .72$). *Neighborhood social contact* was measured by (1) the frequency of contact with relatives; and (2) the frequency of contact with friends on a six-point scale ($r = .69$). *Social trust* was measured by (1) most people cannot be trusted; and (2) it is better not to interact with neighbors to avoid trouble on a six-point scale ($r = .63$). *Social participation* was measured by asking respondents to indicate their membership of clubs or associations. The correlation coefficients among dimensions of social capital ranged from -0.005 to 0.18 , suggesting that they were weakly correlated. Although we did not directly assess the validity of the measurements, many items were found to have significant relationships with other theoretical concepts in previous studies and thus have construct validity. The items on social trust and membership of organizations were positively correlated with self-rated health (Cheng & Chiang, 2002). The items on neighborhood closeness and frequency contacts with friends, relatives, and neighbors were positively related to individual health and status-based sociable resources (i.e., education, income) and assets-based social resources (i.e., home ownership; Lin, Fu, & Hsung, 2001; Tsai, 2006). In terms of content validity, our measures cover both cognitive and structural social capital, with similar weight given to each. Within the structural social capital questions, one relates to group membership and one to frequency contacts of friends and relatives. Within the cognitive social capital questions, one is for social trust and the other is for the perception of political influence. The measure on neighborhood closeness covers both structural and cognitive social capital. Our measurements also tap into bonding, bridging, and linking social capital with questions about bonding relationships with neighbors, friends, and relatives, bridging social capital if they join organizations which connect them to people of a different social identity, and linking social capital through political influences in the larger society. Although we defined social capital as a group property, we controlled

Table 1

Factor analysis of neighborhood-level social capital characteristics, Taiwan social change survey, 1995 and 2000

	Neighborhood closeness	Political influence	Neighborhood social contact	Social trust	Social participation
Number of neighbors' homes that you regularly visit	0.948	-0.013	-0.064	0.024	0.010
The feelings that this is a close-knit neighborhood	0.910	0.040	0.087	-0.016	-0.005
Citizens can contribute to local/city policies if they want to	-0.096	0.889	-0.000	0.044	0.160
Citizens have influences on improving the society	0.131	0.871	-0.012	-0.041	-0.134
The frequency of contacts with relatives	0.001	0.030	0.884	-0.008	-0.070
The frequency of contacts with friends	0.015	-0.044	0.860	0.012	0.085
Most people cannot be trusted	-0.128	0.085	0.044	0.862	-0.104
It is better not to interact with neighbors to avoid troubles	0.153	-0.081	-0.042	0.843	0.090
Membership of clubs or associations	0.006	0.023	0.008	-0.016	0.982

individual-level social capital in the analyses to assess whether the effects of neighborhood-level social capital exist above and beyond individual-level social capital.

Smoking and drinking variables

Individual-level smoking was measured by the question, "On average, about how many cigarettes do you now smoke in a day?" with responses ranging from "no cigarettes" to "more than two packs a day" on a seven-point scale. Smoking was recoded as 0 for no use of cigarettes and 1 for any use of cigarettes. Individual-level drinking was measured by the question, "How often do you drink alcohol?" on a four-point scale including "none at all," "occasionally," "drink often but rarely get drunk," and "drink often and often get drunk". Drinking was recoded as 0 for "none at all" and "occasionally" and 1 for "drink often but rarely get drunk" and "drink often and often get drunk".

Sociodemographic variables

The individual-level SES was calculated from two indicators: educational attainment and monthly household income. Education was measured by asking respondents, "What is the highest level of formal education you have completed?" with responses ranging from "less than elementary school" to "graduate school" on a seven-point scale. Income was measured by asking participants, "How much is your household's total income per month, including income from all household members living with you?" with responses ranging from "<NT\$10,000" to "≥NT\$220,000" on a seven-point scale (US\$1 ≈ NT\$31). A composite SES score was created by averaging levels of education and family income for each respondent. The SES score was categorized into "high" versus "low" using a median split. Gender, age (continuous), race/ethnicity (Taiwanese, Hakka, mainlanders, indigenous populations, and others), and marital status (single, married, divorced and separated, and others) were included in the analyses

as control variables. Because more than 70% of people were Taiwanese, we created a dummy-coded variable and used non-Taiwanese as the reference group. Marital status was recoded as 1 = married and 0 = others.

Analysis

We used multilevel models to analyze our data. We used the SAS GLIMMIX to fit multilevel models with a binomial distribution assumption and a logit link. The method of estimation was a restricted maximum likelihood procedure. Models were firstly fitted with neighborhood-level social capital characteristics. The second stage was to fit models with individual-level social capital and sociodemographic characteristics. In the third stage, models included neighborhood-level social capital, individual-level social capital, and sociodemographic characteristics to assess whether the effects of neighborhood-level social capital could be explained by individual-level social capital and sociodemographic characteristics. Lastly, two-way interaction terms of gender and separate neighborhood-level social capital characteristics were added to the model to test whether the effects of neighborhood-level social capital characteristics on smoking and drinking behavior were modified by gender.

Results

Table 2 presents smoking and drinking prevalence by sociodemographic characteristics and gender. About 51.2% of men and 5% of women reported smoking cigarettes. About 15.1% of men and 2.6% of women reported drinking frequently. For male smoking, men who were 30–39 years of age, indigenous, with middle school education, with an income between NT\$30,000 and NT\$49,999, and widowed/divorced were more likely to smoke than their counterparts. Furthermore, individuals living in neighborhoods with a low amount of closeness, low political influence, low social contact, high social trust, and

Table 2

Description of neighborhood-level social capital, individual-level social capital, individual-level characteristics, smoking, and drinking, Taiwan social change survey, 1995 and 2000

	Smoking ^a (%)		Drinking ^b (%)	
	Male	Female	Male	Female
Total	51.23	5.00	15.15	2.62
<i>Individual characteristics</i>				
<i>Age</i>				
20–29	56.31	9.18	14.78	3.83
30–39	62.06	3.38	17.43	2.86
40–49	53.25	5.07	15.64	2.64
50–59	49.60	2.59	16.00	2.59
≥60	46.91	5.74	10.68	0.83
<i>Race/ethnicity</i>				
Taiwanese	54.75	4.15	14.15	2.62
Hakka	57.37	2.96	17.20	1.49
Mainlander	48.59	6.99	15.41	2.19
Indigenous and others	64.86	22.22	35.14	8.20
<i>Education</i>				
<Elementary	55.91	5.85	8.70	1.47
Elementary	58.12	5.17	18.35	1.95
Middle school	69.33	5.75	21.43	3.10
High school	57.28	6.23	15.67	2.92
≥College	39.16	2.31	9.52	3.36
<i>Family income</i>				
<NT\$30,000	56.64	6.99	14.39	1.89
NT\$30,000–NT\$49,999	57.88	4.05	16.08	2.72
NT\$50,000–NT\$69,999	55.01	5.90	16.14	2.55
NT\$70,000–NT\$99,999	53.03	3.93	13.45	3.28
>NT\$99,999	48.22	4.04	15.52	2.80
<i>Marital status</i>				
Single	56.68	8.63	15.46	3.95
Married	53.01	3.32	14.72	2.63
Widowed/divorced/others	59.85	10.39	18.25	1.31
<i>Social capital characteristics</i>				
<i>Neighborhood closeness</i>				
High	50.25	4.75	14.45	3.34
Middle	52.09	4.86	15.19	2.61
Low	60.06	5.41	15.75	1.87
<i>Political influence</i>				
High	53.51	4.19	15.67	2.42
Middle	54.56	4.17	15.40	2.27
Low	54.63	6.63	14.40	3.17
<i>Neighborhood social contact</i>				
High	52.29	4.13	15.65	2.48
Middle	53.22	4.82	16.75	2.67
Low	57.06	6.09	13.15	2.73
<i>Social trust</i>				
High	56.63	6.49	14.31	3.17
Middle	51.66	5.10	16.11	2.74
Low	54.36	3.44	15.05	1.98
<i>Social participation</i>				
High	55.38	5.16	14.40	1.62
Middle	53.33	3.92	14.26	3.10
Low	53.96	6.01	16.62	3.20

^a Smoking is defined as use of any cigarette.

^b Drinking is defined as “drink often but rarely get drunk” or “drink often and often get drunk”.

high social participation were more likely to smoke than their counterparts. Regarding female smoking, women who were less than 30 years of age, indigenous, had high school education, had income less than NT\$30,000,

widowed/divorced, lived in neighborhoods with low closeness, low political influence, low social contact, high social trust, and low social participation were more likely to smoke. For male drinking, the pattern is similar to smoking except that those who had an income between NT\$50,000 and NT\$69,999 and who lived in neighborhoods with high political influence, median social contact, median social trust, and low social participation were more likely to drink. For female drinking, women who were less than 30 years of age, indigenous, had college education, had income between NT\$70,000 and NT\$99,999, single, lived in neighborhoods with high closeness, low political influence, low social contact, high social trust, and low social participation were more likely to drink than their counterparts.

Multilevel modeling results are shown in Table 3 for smoking. Models 1–3 are random intercept models in which the mean of the outcome varied by neighborhood. Model 4 is a random slope model in which the coefficient for gender was allowed to vary by neighborhood. Model 1 indicates that the respondents in neighborhoods with higher neighborhood closeness (OR = 1.13) and lower social trust (OR = 0.88) were more likely to smoke. Model 2 shows that individual-level political influence (OR = 0.90) and social trust (OR = 0.82) were associated with a decreased probability of smoking, whereas individual-level social contact was associated with an increased probability of smoking (OR = 1.14). Individuals characterized as male, younger, and lower SES reported a higher probability of smoking than their counterparts. Model 3 suggests that political influence was associated with an increased probability of smoking, after adjusting for individual-level social capital and sociodemographic characteristics (OR = 1.13); however this effect disappeared after adding interactions between neighborhood social capital and gender in Model 4. Model 4 shows that the effect of neighborhood-level social trust (OR = 0.75) is significant after including interactions between gender and social capital characteristics. A significant interaction was found between social trust and gender ($\beta = 0.29$; OR = 1.34).

Table 4 presents a similar set of multilevel models for drinking. Model 1 shows that higher neighborhood social participation (OR = 1.18) was associated with an increased probability of drinking. Model 2 shows that individual social contact (OR = 1.21) and individual social participation (OR = 1.13) were associated with a higher likelihood of frequent drinking. Individuals characterized as male, younger, non-Taiwanese, and lower SES had a higher probability of drinking than their counterparts. Model 3 shows that neighborhood social participation remained to be positively associated with individual drinking behavior after controlling individual differences (OR = 1.15). Model 4 shows significant effects of neighborhood closeness (OR = 0.57) and social participation (OR = 1.43) and an interactive effect between neighborhood closeness and gender ($\beta = 0.21$; OR = 1.75).

Figs. 1 and 2 present the relationship between social capital and level of smoking or drinking by gender, using a median split. Fig. 1 presents the relationship between social trust and smoking by gender. Although women had a lower level of smoking than men in both low- and high-trust neighborhoods, the slopes show that

Table 3

Associations between neighborhood-level social capital, individual-level social capital, individual-level characteristics, and individual smoking, Taiwan social change survey, 1995 and 2000

	Model 1	Model 2	Model 3	Model 4
Neighborhood closeness	1.13*** (1.04, 1.23) ^b		0.99 (0.88, 1.11)	0.94 (0.73, 1.20)
Political influence	1.05 (0.97, 1.14)		1.13* (1.01, 1.25)	1.23 (0.96, 1.56)
Neighborhood social contact	1.07 (0.99, 1.16)		1.05 (0.95, 1.16)	1.16 (0.94, 1.42)
Social trust	0.88** (0.82, 0.96)		0.95 (0.86, 1.06)	0.75* (0.60, 0.93)
Social participation	1.03 (0.95, 1.11)		1.08 (0.97, 1.20)	1.17 (0.93, 1.47)
Individual closeness		1.05 (0.96, 1.16)	1.05 (0.95, 1.16)	1.06 (0.95, 1.17)
Individual political influence		0.90** (0.82, 0.97)	0.87** (0.80, 0.95)	0.87** (0.80, 0.96)
Individual social contact		1.14** (1.04, 1.24)	1.12* (1.02, 1.23)	1.12* (1.01, 1.23)
Individual social trust		0.82** (0.75, 0.90)	0.83** (0.76, 0.92)	0.84** (0.76, 0.92)
Individual social participation		0.92 (0.84, 1.00)	0.90* (0.83, 0.99)	1.12 (0.89, 1.41)
Male/female		30.02** (23.62, 38.11)	30.33** (23.86, 38.56)	31.79** (24.60, 41.07)
Age		0.97** (0.97, 0.98)	0.97** (0.97, 0.98)	0.97** (0.97, 0.98)
Taiwanese/Non-Taiwanese		0.81 (0.64, 1.02)	0.81 (0.64, 1.02)	0.81 (0.64, 1.02)
Individual SES		0.72** (0.66, 0.78)	0.72** (0.66, 0.78)	0.72** (0.66, 0.78)
Married/others		0.85 (0.70, 1.04)	0.86 (0.71, 1.05)	0.86 (0.71, 1.06)
Gender × Neighborhood closeness				1.06 (0.82, 1.38)
Gender × Political influence				0.90 (0.69, 1.17)
Gender × Neighborhood social contact				0.89 (0.71, 1.11)
Gender × Social trust				1.34* (1.06, 1.70)
Gender × Social participation				0.91 (0.71, 1.16)

* $P < 0.05$, ** $P < 0.01$.

^a Odds ratios.

^b 95% confidence intervals.

neighborhood-level social trust had a stronger decreasing effect on smoking for women than for men. Fig. 2 presents the relationship between neighborhood closeness and drinking by gender. The slopes show that neighborhood closeness had a stronger decreasing effect on drinking for women than for men.

Discussion

Since the government of Taiwan opened the tobacco and alcohol markets to foreign companies in 1987, society has

experienced increases in alcohol use for both men and women. Between 1992 and 1997 the prevalence of drinking at least twice a month increased from 26.1% to 41.4% among men and 5.6% to 10% among women (Lai, 2004). The most current health survey showed that 23.8% of men and 7.6% of women had more than five to seven drinks during a single occasion every two weeks (Executive Yuan of Taiwan, 2005). The prevalence of male smoking slightly decreased from 50.5% to 46.5% between 1992 and 2002; however, the prevalence of female smoking increased from 2.7% to 4.2% (Cheng, Wen, Tsai, & Tsai, 2002; Yen, Pan, Yen, & Lee,

Table 4

Associations between neighborhood-level social capital, individual-level social capital, individual-level characteristics, and individual drinking, Taiwan social change survey, 1995 and 2000

	Model 1	Model 2	Model 3	Model 4
Neighborhood closeness	1.02 ^a (0.91, 1.14) ^b		0.92 (0.79, 1.07)	0.57** (0.41, 0.81)
Political influence	1.03 (0.91, 1.17)		1.04 (0.91, 1.19)	1.14 (0.84, 1.56)
Neighborhood social contact	0.99 (0.87, 1.11)		0.90 (0.79, 1.03)	1.08 (0.80, 1.45)
Social trust	0.92 (0.82, 1.04)		0.94 (0.83, 1.08)	0.86 (0.63, 1.17)
Social participation	1.18** (1.04, 1.33)		1.15* (1.01, 1.32)	1.43* (1.07, 1.92)
Individual closeness		1.03 (0.91, 1.17)	1.06 (0.93, 1.22)	1.06 (0.92, 1.22)
Individual political influence		0.97 (0.86, 1.08)	0.96 (0.86, 1.09)	0.97 (0.86, 1.09)
Individual social contact		1.21** (1.07, 1.37)	1.25** (1.10, 1.43)	1.25** (1.10, 1.42)
Individual social trust		0.96 (0.85, 1.08)	0.98 (0.86, 1.11)	0.98 (0.86, 1.12)
Individual social participation		1.13* (1.01, 1.26)	1.08 (0.96, 1.21)	1.08 (0.96, 1.22)
Male/female		6.73** (4.86, 9.34)	6.85** (4.96, 9.48)	7.65** (5.37, 10.91)
Age		0.98** (0.97, 0.99)	0.98** (0.97, 0.99)	0.98** (0.97, 0.99)
Taiwanese/Non-Taiwanese		0.65** (0.63, 0.67)	0.67** (0.50, 0.90)	0.67** (0.49, 0.90)
Individual SES		0.83** (0.74, 0.93)	0.82** (0.73, 0.92)	0.82** (0.73, 0.92)
Married/others		1.06 (0.80, 1.39)	1.07 (0.81, 1.40)	1.08 (0.82, 1.42)
Gender × Neighborhood closeness				1.75** (1.21, 2.52)
Gender × Political influence				0.89 (0.64, 1.26)
Gender × Neighborhood social contact				0.81 (0.59, 1.12)
Gender × Social trust				1.12 (0.80, 1.56)
Gender × Social participation				0.77 (0.56, 1.07)

* $P < 0.05$, ** $P < 0.01$.

^a Odds ratios.

^b 95% confidence intervals.

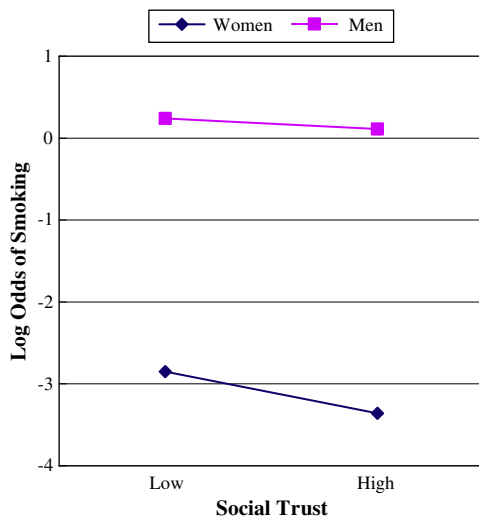


Fig. 1. Relationship between neighborhood-level social trust and smoking by gender.

1994). Although the rates of female smoking and drinking are comparatively low in Taiwan, the normative traditions that protect women from the dangers of tobacco and alcohol use are not immutable. With globalization, the transformation of economic structure, women's liberation movement, and the entry of women into the workforce on a mass scale, the roles and behavior of women are constantly changing (Liang et al., 2002). In addition, the tobacco and alcohol industries acknowledge interests in expanding the market to female consumers. They typically use themes highlighting independence, sophistication, glamour, and sexuality in advertising to women and girls in Asia. (Kaufman & Nichter, 2001). The potential for future tobacco and alcohol promotion through liberalized trade suggest an urgent need to recognize the social

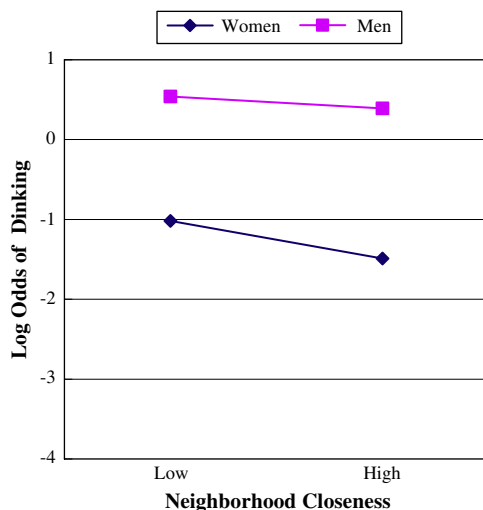


Fig. 2. Relationship between neighborhood closeness and drinking by gender.

consequences of tobacco and alcohol use (Morrow & Barraclough, 2003b).

Our results partially support the hypotheses that the effects of social capital differ by gender. Because of differences in the samples and outcomes of interest, it is difficult to determine whether our findings are consistent or contradictory with prior research. We found that social trust is relatively beneficial in reducing a woman's probability of smoking, but that the effect was weaker for men. One explanation may be that women are more likely to be part of tightly bonded social networks that typically result in trusting relationships. They are also more likely to be the people who can be relied upon to provide support to other network members (Kavanagh et al., 2006). Therefore, living in a place with a higher level of trust may have more influence on women than men.

Neighborhood closeness was found to have a stronger decreasing effect on drinking for women than for men. Given that women are likely to spend more time in their neighborhoods, it is plausible that they would benefit more than men from a high level of neighborhood closeness (Kavanagh et al., 2006; Warr, 2006). Another explanation may come from the geographical distribution of neighborhoods. Since more than 60% of close-knit neighborhoods in our data were located in rural areas, the norms against female drinking in rural communities may explain the stronger negative influence of neighborhood closeness on drinking among women. On the other hand, the culture of city life may increase one's opportunity to gain access to alcohol. Social gatherings after work are more common among "professional women" in big cities compared to women in other geographical areas of Taiwan. Future research needs to clarify this relationship by studying the social context in which women are encouraged to drink.

Regarding the main effects of social capital, most previous studies indicated that a decline in social capital contributes to a prevalence of unhealthy behavior including problem drinking (Wilson, 1987). However, social participation was found to be positively associated with drinking, after controlling for individual-level social capital and sociodemographic differences. The inconsistency of these findings with prior studies may be because of the way drinking behavior were measured (Lindstrom, 2005). In contrast with prior studies that measured the outcomes of binge drinking or drunk driving, our study measured drinking behavior by asking respondents whether they drink frequently. Another reason for the positive association between social participation and drinking may come from the drinking culture in Taiwanese society. Taiwanese society tolerates and even encourages considerable alcohol consumption at social events (i.e., weddings) (Liang, Chou, Ho, Shieh, & Yang, 2004). It is highly possible that people who frequently participate in clubs and associations may be involved in various social occasions where alcoholic beverages are frequently served. In such social contexts, the provision of alcohol is regarded as a common courtesy. People renew personal bonds or release stress over a drink. Therefore, participation in various associations may increase the opportunities to drink.

Our study found that social capital measured by general trust in people and neighborhood closeness was negatively

associated with smoking and drinking behavior respectively, while specific social interactions such as participation in associations was positively associated with drinking behavior. In our analyses, general social trust and neighborhood closeness can be interpreted as a manifestation of cognitive social capital, which may decrease one's substance use due to lower levels of stress and anxiety inherent in trusting social relationships. On the other hand, participation in associations in Taiwan, which represents the structural dimension of social capital, can increase opportunities for alcohol use. This suggests that structural social capital may form the social context that facilitates drinking norms and provides drinking opportunities.

Our study shows that political influence was neither associated with smoking nor drinking behavior. Since smoking and drinking behavior are more directly related to social relationships and substance using norms of communities, neighborhood-level political influence, comparatively, can be a distal determinant of smoking and drinking behavior. Therefore, its effect is less likely to be shown in a neighborhood-level social capital study. Our study also found that individual-level social contact had significant effects on smoking and drinking, but neighborhood-level social contact did not. This may suggest that individual contact with friends and relatives did promote smoking and drinking behaviors through social activities; however, since not all of the friends and relatives live inside the neighborhood boundaries, using aggregate scores at the neighborhood level may not truly represent neighborhood-level social contacts. Future research needs to revise the interview questions to ask specifically where the social contacts take place.

Our findings should be considered in light of the following limitations. First, we did not have longitudinal social capital measurements, which may have generated selection bias (Tienda, 1991). The relationships of social capital and smoking and drinking may be due to the non-random selection of individuals from neighborhoods with different levels of social capital and not because of the influences of social capital. Therefore, the relationships found between neighborhood social capital and smoking and drinking should perhaps be more cautiously interpreted as associations rather than as evidence of the influences of social capital. Second, the study did not measure all aspects of social capital (i.e., reciprocity). However, we measured five aspects of social capital including neighborhood closeness, political influence, neighborhood social contact, social trust, and social participation and assessed their influences. Future research needs to improve neighborhood measurements by including additional aspects of social capital. Third, we measured social participation by respondents' reports of membership of organizations. This item has been criticized in having a masculine bias because men are more likely to participate in formal organizations and tend to ignore women's contributions in the participation in informal network-building activities (Healy, Haynes, & Hampshire, 2007). Future research needs to develop gender-specific indicators for the domain of social participation. Fourth, our findings are subject to correlation errors whereby the associations between

aggregate levels of social capital and individual smoking or drinking behavior may have been falsely inflated since the measures are from the same data source.

Conclusions

These limitations aside, this study suggests that social capital may directly and interactively influence individual smoking and drinking behavior regarding gender. Future research is needed to identify possible mechanisms by which social capital differentially influences health behavior between genders in the context of the Asian society. Examples of these mechanisms are women and men's varying exposure to different aspects of neighborhood lives, types and patterns of their local social networks, and their psychological responses to the quality of neighborhood environment.

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