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Women's Political Leadership and Adult Health: Evidence from Rural and Urban China

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Abstract

This study examined the role of women's political leadership at the community level in China, a context that has experienced recent political and socioeconomic change and has a distinctive rural-urban divide. Drawing on longitudinal data from the China Family Panel Studies (N = 40,918~52,406 person-year observations), we found that female community directors outnumbered male directors in urban China but were much less common in rural areas. Female community directors had higher levels of human capital regardless of rural or urban location. Residents living in female-directed communities reported better mental health, but not physical health or life satisfaction, compared to those living in male-directed communities, and this association was most robust among rural women. For rural women, the mental health benefit of living in female-directed communities was partially explained by reduced personal experience of gender discrimination, suggesting that female leadership fosters ideational change toward women that lowers discriminatory behaviors among constituents.

Keywords

adult health; China; community; gender discrimination; political leadership

Political participation is an important domain of women's status and empowerment. In most parts of the world, women remain dramatically underrepresented in elected political positions, however. In the United States, for example, women held only 20.0% of seats in the Senate, 19.3% of seats in the House of Representatives, and 24.2% of seats in state legislatures in 2015 (IWPR, 2015). Although the global average of women's representation in national legislative bodies more than tripled from 6.2% in 1975 to 20.4% by 2015, a vast gender disparity remains (Macmillan, Shofia and Sigle 2018).

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¹Additional research also points out that quotas to increase women's political participation at various levels of government do not guarantee empowerment for female leaders, their female constituents, or positive health and development outcomes in the community (O'Neil, Plank, & Domingo (2015), Htun and Jones (2002), and Pinheiro (2011)).

Despite political underrepresentation, a growing body of research finds that women's political participation is positively related to population health and well-being. Much of this work focuses on women's legislative representation at the national or state level and shows that a higher proportion of female legislators is associated with improved health, including lower infant, child, and maternal mortality, and higher child nutrition and immunization rates (Heaton 2015; Homan 2017; Macmillan, Shofia and Sigle 2018; Quamruzzaman and Lange 2016; Swiss, Fallon and Burgos 2012).

An emerging area of research considers women's leadership at the community level. Scholars have argued that local political participation could exert more influence than women's participation at higher levels of government, where legislation is a distal factor in the causal chain affecting health and development outcomes (Iyer et al. 2012; Kalsi 2017). To date, only a handful of studies examine the relationship between women's community-level leadership and population health. Most focus on India, where a government policy randomly reserves leadership positions in village councils for women (Chattopadhyay and Duflo 2004a, 2004b). Exploiting this exogenous variation, several studies have found that women's community leadership has had positive effects on child mortality (Kalsi 2017; Kumar and Prakash 2017).

Two theoretical mechanisms are hypothesized to produce these effects. First, women's political leadership may lead to structural change by increasing investment in public goods such as drinking water and sanitation that improve health (Bardhan, Mookherjee and Monica 2010; Besley et al. 2004). Second, women's political leadership may foster ideational change among local constituents, leading to positive behavior change that ultimately influences health.

Notably, most work on women's community leadership and health focuses on child well-being; little is known about the effect of female leadership on adult physical and mental health, let alone whether structural or ideational drivers play a role. Indeed, we might expect adult psychological conditions to be more amenable to the influence of local leadership than physical health, especially via ideational change, in the short run. Furthermore, since existing research examines the effect of leadership positions that are officially reserved for female candidates, it is unclear to what extent women would be elected—and how effective they would be—in settings without gender quota policies. While several studies show that women's local leadership can lead to structural and ideational change, none of these studies investigates these mechanisms in a framework with expected health outcomes (Kalsi 2017; Kumar and Prakash 2017).

We add to the nascent literature on women's community leadership and health by studying contemporary China, a setting without gender quotas. We consider health outcomes for adult women and men, including physical and mental health, and investigate the extent of female leadership and its associations with health. We also examine whether structural or ideational mechanisms plausibly contribute to any relationship between women's community leadership and adult health. This investigation is important because existing evidence on gender quotas as a strategy for empowering women has been debated (Pinheiro 2011), and the evidence in regard to women's leadership and health from settings where

women leaders gain power through quotas does not generalize to settings where women are elected in the absence of such systems. Through analyses of data from China, we explore whether and how relationships between women's community leadership and health are observed in a setting without quotas, expanding the evidence base regarding women's empowerment and its consequences for population health.

Any study of women's community leadership in China must consider how the influence of political leaders varies across rural and urban settings. In rural areas, community leaders wield a great deal of decision-making power within the village through their formal control of collective economic resources and informal social ties (Tsai 2007; Wang and Yao 2007). In urban areas, community leaders are constrained by both higher-level government, which dictates communities' financial budgets, and by relatively resolute constituencies that have begun to embrace privatization and individual autonomy (Pow 2007; Yip 2012). Given these differences, we will explore the implications of women's leadership separately in urban and rural areas.

Our study asks three main research questions. First, in light of women's socioeconomic and political status today, which Chinese women acquire local leadership positions in rural and urban areas? Second, what is the association between female community leadership and the physical and mental health of men and women across rural and urban communities? Third, which mechanisms—structural, ideational, or both—link women's leadership to specific adult health outcomes? With respect to structural change, we examine how female leadership is associated with provision of local public goods that could affect health. As for ideational change, we explore the role of female leaders in shaping community members' experiences of gender discrimination. Given that gender discrimination is considered a main cause of women's mental illness in China (Pearson 1995), female community leadership could be an important catalyst for improving this aspect of women's well-being.

BACKGROUND

Previous Research on Women's Community Leadership

There is little research on women's community-level leadership and health; most is centered in India, given a 1992 amendment to the constitution that randomly reserved one-third of leadership positions at the village, block, and district levels for women. In this case, only female candidates can be slated for these positions for their set terms. Several studies have reported positive effects of female village leadership on health and well-being. In the Indian state of West Bengal, for example, Beaman et al. (2012) found that female leadership improved adolescent girls' educational outcomes and reduced their time spent on household chores, but did not affect outcomes for slightly older women. Other research has found that female village leadership led to higher rates of hospital births; reduced neonatal and child mortality; narrowed gender disparities in child mortality (Bhalotra and Clots-Figueras 2014; Kumar and Prakash 2017).

There are two theoretical mechanisms through which women's political leadership is hypothesized to affect health. The first, *gendered policy preference*, focuses on concrete changes in structures and institutions. Given women's role as caretakers, this theory posits

that female leaders may be more sensitive to social issues in general, particularly those that benefit women and children (Koenen, Lincoln and Appleton 2006). Therefore, they tend to have stronger preferences than male leaders for promoting laws and policies related to women's and children's needs and interests or for allocating public spending toward social welfare and health-related infrastructure (Bhalotra and Clots-Figueras 2014). Many of these legislative actions and infrastructure investments are targeted toward women and enhancing their well-being, although they could lead to improvements in men's health as well.

Empirical evidence for this structural mechanism is mixed. In West Bengal, communities with mandated female village council leaders invested more in the provision of drinking water than in communities without female leaders (Chattopadhyay and Duflo 2004a, 2004b). In the Indian states of Karnataka, Rajasthan, and Bihar, this finding did not hold; however, female leadership did lead to successful employment-generating schemes for women (Dunning and Nilekani 2013).

The second mechanism, the *role-model effect*, works by changing attitudes and norms and subsequently behaviors that could impact health and other outcomes. Female political leaders can serve as role models, inspiring others to raise aspirations and challenge gender stereotypes. As such, girls and adult women may take the initiative to improve their socioeconomic status, life conditions, and health (Pratley 2016). Men could also be inspired to adopt more gender egalitarian attitudes, which have been linked to lower levels of stress, anxiety, and depression among men (Jaehn et al. 2020; Kim and Luke 2020).

Several studies at the community level have found evidence of ideational change in response to women's leadership. Research in West Bengal reported that female community leadership promoted more egalitarian gender attitudes among men and women (Beaman et al. 2009). Female leadership at the village or block level has also been found to reduce parents' preference for sons (Chauchard 2014; Kalsi 2017). In a similar process of ideational change, Chauchard (2014) found that exposure to village leaders who were members of an historically disadvantaged lower-caste group reduced villagers' discriminatory beliefs and hostile actions toward lower-caste individuals. These studies are informative and provide insights into possible structural or ideational mechanisms; however, they are all from India and do not focus on health.

In sum, the emerging literature leaves numerous gaps in our understanding of the consequences of female community leadership for health. First, there is little research on the effect of female leadership on adult health beyond maternal mortality, and yet adult populations in low- and middle-income countries are confronted with growing burdens of chronic disease and mental health conditions (Charlson et al. 2016). Second, as described earlier, we know little about whether women's community-level leadership is associated with health in settings without gender quotas in elections. Indeed, we know little in general about whether women who win positions in open elections possess the power to accomplish their goals once elected (O'Neil, Plank and Domingo 2015). Third, evidence on the mechanisms that link women's community leadership to specific health conditions is limited, as only a few studies investigate potential mechanisms empirically (Bhalotra and Clots-Figueras 2014; Kalsi 2017).

Our study extends existing research on women's community leadership to contemporary China—a setting where political positions are not reserved for women and women may face multiple challenges to being elected. We investigate whether women's community leadership is associated with the physical and mental health of adult women and men and two mechanisms that could account for these relationships. With respect to female leaders' policy preferences, we consider the availability of public goods that are associated with improved health. We explore the role-model mechanism by considering residents' experiences of gender discrimination. We argue that in countries like China and India, where strong son preference and restrictive gender norms persist, electing female community leaders may be particularly influential in changing men's gender attitudes and reducing gender discrimination against women. Given that gender discrimination is an important risk factor for women's mental illness in both Eastern and Western societies (Pearson 1995), we expect that exposure to female community leaders will have a positive influence on female constituents' mental health.

China Context

Before turning to the analysis, we provide additional detail on two dimensions of the Chinese setting especially relevant for this study: women's participation in the political and economic spheres; and local governance structures, particularly their variation across rural and urban areas.

Women's political and economic participation.—In China, women's political and economic participation has oscillated from the socialist transformation in the 1950s to a more market-oriented economy beginning in 1978. Women's full participation in political and economic life was a major aim of the socialist regime, and Chairman Mao famously proclaimed that women “hold up half the sky” under communism. For example, during the Cultural Revolution (1966–1976), the labor force participation rate for urban Chinese women was greater than 90%, one of the highest in the world (Bauer et al. 1992), and almost half of all township, town directors, and deputy directors were women (Howell 2002). Despite these high participation rates, gender inequalities in the economic and political realms persisted, including women's overrepresentation in low-status positions in the local work unit (Liu 2007).

Progress toward improving women's socioeconomic and political status has slowed, if not retreated, in the recent period of market reform. Despite near gender parity in levels of educational attainment since the mid-2000s, Chinese women often cannot translate their education into important political or economic positions. Men have captured the most lucrative new jobs and migration opportunities, and women generally occupy lower-paying positions or have retreated from the labor market to become housewives (Song and Luke 2014), a pattern that is exacerbated by the expectation that women are responsible for housework and caregiving (Short et al. 2002).

In terms of political representation, the share of women in the Standing Committee of the National People's Congress declined from 25% in 1975 to 10.9% in 2018 (authors' calculation). By 2000, less than 10% of city and county mayors were women, and the

proportion of female township and town directors and deputy directors had fallen below 10% (Howell 2002). Thus, the legacy of socialism and persistent influence of patriarchal structures combine with recent trends to provide a complex backdrop for women's leadership in China. As in many other parts of the world, there are ongoing barriers for Chinese women to win open elections and to be effective once elected.

Rural and urban community governance.—We also expect that the extent to which community leaders will be able to effect structural and ideational change will depend on whether their locations are rural or urban. China's government is a one-party system run by the Communist Party of China (CCP). While many government positions are appointed, residents elect their local leaders, including rural and urban community committees. Community committees are the smallest political and administrative division in China, and share the same organizational structure in rural and urban locations. Their administrative body is known as the residents' committee (*ju wei hui*) in urban areas and the villagers' committee (*cun wei hui*) in rural areas.

Elections for members are held every three years. Each committee is headed by a director responsible for making executive decisions and delegating other committee members to handle civil disputes, public order and security, family planning and public health initiatives, social welfare, collective finance, and other community affairs (Wang, Zhang and Kang 2019). Although China is an authoritarian country, community committees are, in principle, autonomous organizations working for the welfare of their constituents. They are also responsible for enacting upper-level government initiatives locally.

Despite the same structure, the mandate and decision-making power of community committees and their leaders differ greatly in rural and urban China. Rural communities have a history of autonomy and local authority. During the 1953–1957 agricultural collectivization, all the households in a village were pressured to join a cooperative. Private ownership of land, farming tools, and draft animals were abolished, and peasants worked the land collectively. These cooperatives evolved into people's communes, which were responsible for planning, and supervising villagers' daily work as well as many aspects of life, including marriages, funerals, education, health, and welfare.

People's communes collapsed after 1978 during the transition to a market economy. Under the new system, rural land and other properties, such as newly established village enterprises, are collectively owned, yet villagers are free to choose their own labor market activities. Agricultural workers rent land and machinery from the village and reap the profits (or losses) of their own agricultural production.

Rural community committees wield considerable local power by controlling, for example, the distribution of revenues from rents and enterprise profits. These revenues are usually the main financial source for investment in public goods and services within the village, including local roads, village schools, irrigation systems, drinking water infrastructure, and healthcare facilities (Tsai 2007; Wang and Yao 2007). Rural community committee directors also have a history of resistance to upper-level government directives. For example,

some community committees handed out unauthorized second-child permits to villagers or reported false birth statistics in defiance of the official one-child policy (Scharping 2003).

Not only do rural community committees enjoy strong economic ties to local residents but they also maintain strong social ties. The rural Chinese population continues to live in close-knit villages and is embedded in local social networks formed generations ago, so community committee members and their leaders are usually well known and respected. Such social and spatial proximity provides community committees with greater persuasive power to enforce upper-level government directives and local village affairs (Wang, Zhang and Kang 2019). Close social ties also enable the diffusion of new ideas and attitudes. Studies have found that rural community committees and their directors can successfully conduct door-to-door health information campaigns (Liu, Sun and Zhao 2014), while urban committees are less effective (Yip 2012).

In urban areas, the foundation of local communities runs somewhat parallel to village organization, yet developments since market reform have left urban committees with relatively less autonomy, local authority, and close social ties to their constituencies. During the socialist period from the 1950s to the 1980s, the work unit, known as *danwei*, was the urban counterpart of the people's commune and functioned as the basic social, economic, and political organizing unit. Urban employees and their families relied exclusively on their affiliated work units for material compensation, including both salaries and in-kind goods and services, such as housing, schools, child care, and medical care. Because the work unit coordinated urban housing, urban residential space was characterized by communal neighborhoods where residents were mostly co-workers (Pow 2007).

The era of reform ushered in a new period of privatization. The work unit no longer controls labor, and individuals are free to seek employment on the open market. Work units' control over housing has also loosened since the 1990s, when commercial housing companies were established. Formerly public housing is now privately owned, and the growing urban middle class prefers to live in newly constructed, market-priced apartments in gated communities. Urban families are now sorted into gated communities primarily by income instead of work unit affiliation (Pow 2007). In addition, urban residents now have more choices about schools, health facilities, and other social services beyond the smaller physical and institutional boundaries of the work unit and communal neighborhood. Unlike their rural counterparts, urban community committees do not own any collective property or generate fiscal revenue on their own but are financially dependent upon upper-level government and must appeal to the county government for public goods provision.

Social networks formed within the work unit have also been weakened during the reform period, as residents in gated communities have neighbors who are mostly strangers. As such, urban community committees' efforts to fulfill the administrative tasks assigned by upper-level government (for example, collecting census data and enforcing family planning policies) has met strong resistance from middle-class families who increasingly value their private lives (Pow 2007; Yip 2012).

In sum, rural community committees in contemporary China have greater decision-making power than urban community committees in spending on infrastructure that could directly affect individuals' livelihoods and health. Rural community committee members and leaders are also embedded in established social networks and are likely to have more frequent and meaningful social interactions with constituents that could affect ideational change. Therefore, we expect rural community committees and directors to have a greater impact on local residents' health than their urban counterparts.

HYPOTHESES

Our first research question considers which Chinese women acquire local leadership positions in rural and urban areas. Data on Chinese election results at the local level are limited, and we provide descriptive evidence based on survey data. Due to patriarchal and patrilineal traditions, and related structural inequalities that disadvantage women, we expect women are less likely to be local leaders than men, especially in rural China. We describe the overall level of women's leadership, as well as the characteristics of women leaders relative to men leaders, across urban and rural communities.

To answer our second research question regarding the impact of female community leadership on adult physical and mental health, we propose and test the following hypothesis.

Hypothesis 1. Individual residents who are exposed to female community directors have better health and well-being than those who are exposed to male community directors.

Given the differences between community committees in urban and rural areas, we expect rural-urban heterogeneity:

Hypothesis 2. The positive associations between exposure to female community directors and individual health and well-being are stronger in rural areas than in urban areas.

We also expect that Chinese women will reap greater benefits from female community leaders than men:

Hypothesis 3. The positive associations between exposure to female community directors and individual health and well-being are stronger for women than for men.

To answer our third research question, we hypothesize that:

Hypothesis 4. The positive associations between exposure to female community directors and individual health and well-being are mediated through access to health-related community facilities, the experience of gender discrimination, or both.

DATA AND METHODS

Data Source

This study used data from the China Family Panel Studies (CPFS), a nationally-representative longitudinal survey of Chinese communities, families, and individuals.

The 2010 CFPS baseline survey interviewed 14,960 households from 635 communities, including 33,600 adults and 8,990 children, located in 25 designated provinces. The approximate response rate was 81%, with the majority of non-response due to non-contact (Xie and Hu 2014). Three full-scale follow-up surveys were conducted in 2012, 2014, and 2016 with follow-up rates of 80.6%, 83.8%, and 82%, respectively. About 69% of the 2010 baseline respondents were re-interviewed in 2016.

Outcome Variables

We examined four health outcomes in the CFPS data; two variables pertain to overall health and well-being and two measure mental health conditions. First, we used individuals' reports of self-rated health, an indicator of overall health status used in numerous social surveys worldwide. Self-rated health was measured by asking respondents to rate their overall health status at the time of interview by selecting one of five categories: poor = 1, fair = 2, good = 3, very good = 4, or excellent = 5. The second measure, life satisfaction, is an indicator of subjective well-being and reflects people's assessments of their quality of life. Life satisfaction was measured on a 5-point Likert scale in response to the question, "How satisfied are you with your life?" The response categories ranged from very unsatisfied = 1 to very satisfied = 5.

The first indicator of mental health is the 6-item Kessler Psychological Distress Scale (K-6), which has been widely used to screen for non-specific psychological distress in general-purpose health surveys (Kessler et al. 2010). K-6 has been validated and adopted in World Health Organization (WHO) World Mental Health surveys in 14 countries, including China (Kessler et al. 2010). In the CFPS, K-6 was measured by asking respondents how frequently they experienced six symptoms of nonspecific psychological distress during the past month. Responses to each symptom were recorded on a 5-category scale (0 = none of the time, 1 = a little of the time, 2 = some of the time, 3 = most of the time, and 4 = all of the time). Responses to the six symptoms were summed to form a single score ranging from 0 to 24, with a higher score indicating a higher level of psychological distress.

The second measure of mental health, the Center for Epidemiological Studies Depression Scale (CESD), assessed depressive symptoms specifically. In 2012, the CFPS employed the 20-item CESD; however, respondent feedback indicated that this long version was burdensome. Therefore, in 2016, CFPS switched to the 8-item short version (CESD-8). For each item, respondents were asked how often they felt or behaved with respect to each symptom in the past week. Responses to each symptom were recorded on a 4-category scale (0 = almost never, 1 = sometimes, 2 = often, and 3 = most of the time). Responses to the eight symptoms were summed to form a single score ranging from 0 to 24, with a higher score indicating more depressive symptoms.

Both K-6 and life satisfaction were measured in 2010 and 2014, while CESD-8 was measured in 2012 and 2016. Self-rated health was measured in all waves, but due to changes in the questionnaire design, the response categories in 2010 were not consistent with those in later waves. Therefore, we used CESD-8 and self-rated health measured in 2012 and 2016 as the dependent variables for the lagged independent variables measured in 2010 and 2014,

respectively. We used K-6 and life satisfaction in 2010 and 2014 as dependent variables for the independent variables also measured in 2010 and 2014.

Independent Variables

The CFPS collected data on community characteristics through face-to-face interviews with a member of each community committee who could draw on official community statistics. We utilized the administrative definition of rural and urban communities in the CFPS, which was determined by the governance body of each community. A community was classified as urban if it was governed by an urban residents' committee; and rural if a rural villagers' committee governed it. The geographic boundaries of these communities are well-defined by township and county governments.

The key predictor in this study is the gender of community committee director, coded as a dichotomous variable (1 = female and 0 = male). We controlled for community leaders' sociodemographic characteristics, including age, educational attainment (middle school or less, high school, or college and above), and political status (member of the CCP, member of any democratic party, or no party membership). We also controlled for social, demographic, and economic conditions of communities, including year of the most recent community election, population size, and median annual net household income per capita.

We also adjusted for individuals' demographic and socioeconomic characteristics that are common determinants of health. These included age, marital status, educational attainment, and net household income per capita. We also controlled for respondents' current smoking status and alcohol consumption with dichotomous variables, as these are two common behavioral risk factors for adult health.

Mediators

We tested two mediators – access to health-related facilities at the community level and individual experiences of gender discrimination. The community facilities included playground, kindergarten, primary school, hospital or clinic, drug store, senior center, and nursing home. In the 2010 and 2014 community surveys, an administrative official reported whether each of these facilities was present in the community at the time of interview (yes = 1; no = 0). In the 2010 and 2014 household surveys of CFPS, respondents were asked whether they were treated unfairly due to gender discrimination in the past year (yes = 1; no = 0). This measure has been partially validated in a recent study, which found that the CFPS respondents who experienced personal discrimination in the past year reported significantly lower levels of generalized trust (Fan 2019). Such retrospective reports of perceived gender discrimination are widely adopted in observational survey research (Kaiser and Major 2006), including China's National Surveys of Women's Social Status. Unfortunately, unlike those surveys, which asked self-reported experiences of gender discrimination in specific domains (for example, job market and domestic violence), the CFPS questionnaire did not probe into specific types of gender discrimination.

Sample

We derived the analytical sample through the following steps. Among 68,849 person-year observations ages 18 or older in 2010–2014, we dropped 7,838 in which respondents lived in communities where community interviews were not administered. In the majority of these person-years (7,274 out of 7,838), respondents had moved from their original communities in 2010 to a location outside the sampled communities in 2014. Although they were interviewed again either in-person or via telephone in 2014, their new destination communities were not surveyed. In the remaining sample of 61,011 person-years, we excluded 1,593 with any missing data on community-level independent variables and another 6,965 with any missing data on individual- or household-level independent variables. Lastly, we dropped seven person-years without valid data on any outcome variable, resulting in a sample of 52,449 person-years. To maximize statistical power, we allowed the analytical sample size to vary depending on the number of valid responses for each outcome variable. As a result, the sample sizes ranged from 40,918 for the CESD-8 measured in 2012 and 2016 to 52,406 for the Kessler-6 scale measured in 2010 and 2014.

Methods

We divided the full sample into four subsamples – rural men, rural women, urban men, and urban women, because we hypothesized that health implications of female community leadership might vary by respondents' gender and between rural and urban locations. For each sample, we estimated the following fixed-effects model:

$$y_{ijt} = \alpha_i + \beta FemaleLeader_{jt} + \gamma X + \delta_j + Wave_t + \varepsilon_{ijt}, \quad (1)$$

Where y_{ijt} is the outcome variable for person i in community j in wave t ; $FemaleLeader_{jt}$ indicates whether the leader of community j in wave t was female (= 1) or male (= 0); X denotes a set of control variables at individual- and community-level; and ε_{ijt} is the random error term. The individual-level fixed effects (α_i) account for unobserved heterogeneity that remains stable within-person over time. The community-level fixed effects (δ_j) accounts for unmeasured between-community variation in local social and physical environments that remain stable over time. The time fixed effects ($Wave_t$) adjusts for common secular trends across the sample. We calculated robust standard errors to adjust for correlations among repeated measures of the same respondents over time.

We performed path analysis to test potential mechanisms linking the gender of community directors to local population health. We calculated bootstrap standard errors with 2,000 replications for statistical inference (Preacher and Hayes 2008). Our path analysis proceeded in several steps (see Figure 1). First, we estimated a fixed-effects model in which a potential mediator was regressed on the gender of community directors (path a in Figure 1), while adjusting for other control variables. We only proceeded if path a was statistically significant. We then estimated a second fixed-effects model in which a health outcome variable was regressed on both the potential mediator (path b) and the gender of community directors (path c'). Path c , as estimated from Equation (1), represents the effect of female community directorship without mediation. To estimate the indirect effect of having a

female community director on a health outcome through a potential mediator, we calculated the product of path *a* and path *b*. A path *c'* represents the effect of female community directorship on a health outcome after accounting for the mediator.

RESULTS

Descriptive Statistics of Community-level Variables

Table 1 shows the descriptive statistics of the community-level independent variables. Female community directors were more common in urban communities. Looking at the bottom row of Table 1, we see that in 2010, about 6% (23 out of 410) of rural communities were headed by female directors, in sharp contrast to nearly two-thirds (140 out of 218) of urban communities. These figures are slightly lower in both rural and urban communities in 2014. Detailed change is shown in online Appendix Table A1. Among the 185 urban communities that were surveyed in 2010 and 2014 (what we refer to as the balanced sample), 29 communities switched the gender of the community director (15 from female to male and 14 from male to female), while the majority (105) maintained female directors in both 2010 and 2014. Of the 359 rural communities that were surveyed in both 2010 and 2014, 23 switched the gender of the community director over time (13 from female to male directors and 10 from male to female), and 6 communities maintained female directors. Communities with leadership changes over time allow us to infer the association between the gender of community directors and local residents' health.

The top panel of Table 1 shows that female directors in both rural and urban communities were significantly better educated than their male counterparts. The gender difference in educational attainment was notable in rural communities in 2010, where over 90% of female directors graduated from high school or above, while more than half of male directors did not complete high school. Gender difference was less pronounced with respect to community directors' age or political status. The community directors were on average in their late forties. Under China's one-party regime, it is not surprising that more than 80% of community directors, male or female, rural or urban, were members of the CCP.

In both rural and urban areas, more than 90% of the communities held their last election within the last three years, which complied with the legal requirements. In rural areas, female-directed communities tended to have larger populations than male-directed communities, but the pattern was reversed in urban areas. The median family income was generally higher in female-directed communities than in male-directed communities in both rural and urban areas.

Descriptive Statistics of Individual-level Variables

Table 2 reports the descriptive statistics of the individual-level dependent variables. Overall, as expected, rural women had the poorest levels of mental health among the four subgroups, indicated by the highest average scores of K-6 and CESD-8, whereas urban men had the best mental health on average, regardless of the time of measurement. The average score of self-rated health was similar across gender and rural-urban subgroups and close to 3, corresponding to "good" health. Likewise, the average life satisfaction score was

similar across gender or rural-urban subgroups, averaging between 3 “neither satisfied nor dissatisfied” and 4 “satisfied.”

Table 3 presents the descriptive statistics of the individual-level independent variables for 2010 and 2014 waves combined. Across different subsamples, the average age was approximately 47 years old and approximately 80% of respondents were married. Urban men were the most educated with 46.6% graduating from high school or above, whereas rural women were the least educated with 42.9% receiving no formal education. Smoking and drinking were rare among women, regardless of residence. Average family income was more than twice as high for urban men and women as for their rural counterparts. Despite the overall low prevalence, women were twice as likely to experience gender discrimination in the past year (about 5%) as men (about 2–2.5%).

Fixed-effects Regression Results

Table 4 reports fixed-effects regression estimates of the key coefficients of interest – the associations between the gender of community directors and local residents’ health and life satisfaction, after accounting for control variables at the community- and individual-levels, individual fixed effects, community fixed effects, and time fixed effects. For rural women (Panel A), living in communities with female directors was significantly associated with a .747 lower K-6 score and a .867 lower CESD-8 score, compared to living in communities with male directors. These associations were statistically significant after Bonferroni adjustment for multiple testing.

The mental health benefit of female community directorship was also observed in rural men (Panel B) and urban men (Panel D), but not in urban women (Panel C). Compared with having a male director, living in a female-directed community was significantly associated with a .602 lower CESD-8 score for rural men (Bonferroni-adjusted p -value = .025) and a .610 lower K-6 score for urban men (Bonferroni-adjusted p -value = .072). On the other hand, the gender of community directors was unrelated to self-rated health or life satisfaction in any gender or rural-urban subgroup.

To formally test Hypotheses 2 and 3, we used the method proposed by Clogg et al. (1995) to compare gender and rural-urban differences in the coefficient estimates of interest across models. As shown in Table 5, there were marginally significant rural-urban differences with respect to CESD-8; for both men and women, the positive association between having a female director and lower CESD-8 scores was stronger in rural communities than in urban communities. Other differences in Table 5 were not statistically significant. These results provide suggestive evidence for Hypothesis 2 regarding the differential influence of women community leadership by rural-urban location but no support for Hypothesis 3 relating this influence to gendered outcomes.

Robustness Checks

We performed several sensitivity analyses to assess the robustness of our results. First, the classification of communities as rural or urban may change over time. In our analytical samples, three rural communities in 2010 were reclassified as urban in 2014, and five urban communities in 2010 were reclassified as rural in 2014. We repeated the same analysis as

in Table 4 after excluding these communities. As shown in online Appendix Table A2, the regression estimates are nearly identical to those in Table 4, suggesting that our findings are not affected by reclassification.

Second, despite high longitudinal follow-up rates in the CFPS, there may have been some non-random attrition among baseline respondents due to migration, mortality, or other reasons. We applied inverse probability weighting (IPW) to adjust for potential selection bias (Wooldridge 2007). The weights we used were calculated as the product of the baseline sampling weights, an IPW factor for household and individual non-response, and a post-stratification weighting factor based on the census data. As shown in online Appendix Table A3, the coefficient estimates remain qualitatively unchanged for rural women and urban men who enjoyed better mental health from living in communities led by female directors. However, the results are less robust for rural men, among whom the negative association between female community directorship and CESD-8 was no longer significant.

Third, to assess the influence of missing data, we repeated the same multiple regression analysis as in Table 4 using multiple imputation with 10 replications. Results are reported in online Appendix Table A4. Despite minor changes in point estimates, the significant mental health benefits from having a female community director persisted for rural women and urban men. For rural men, the estimate of mental health benefit with respect to CESD-8 was sensitive to missing data imputation.

Fourth, the small number of rural communities that elected women as the directors may be outliers that disproportionately affect our regression estimates. To address this concern, we iteratively removed observations in one of the 35 rural communities that elected female directors in 2010 or 2014 and repeated the same multiple regression analysis as above. The results from these 35 “leave-one-out” replications are qualitatively unchanged. A related concern is that female-directed communities were spatially clustered in certain regions where, for unmeasured factors (e.g., local culture, history, and political condition), female candidates are more likely to win election, and thus our regression estimates would be driven by unobserved regional heterogeneity. Online Appendix Figure C1 depicts the geographic distributions of the CFPS communities that were led by female directors. Overall, female-directed rural and urban communities were not concentrated in any single province but distributed across multiple regions of China where the CFPS data are available. One exception is Shanghai with relatively high numbers of female-directed rural and urban communities. To assess the potential of undue influence, we excluded the data from Shanghai, and the results again remain qualitatively similar (see online Appendix Table A5).

Fifth, we evaluated whether or not the regression results were sensitive to alternative constructions of the dependent variables. For K-6, we created an index score using factor analysis. For depressive symptoms, recall that we used the 8-item CESD scale for 2012 and 2016. To test robustness, we instead used the 20-item scale for both waves. For self-rated health and life satisfaction, we combined response categories with small cell sizes; self-rated health became a 3-point scale (1 = poor or fair, 2 = good, and 3 = very good or excellent) and life satisfaction a 4-point scale (1 = unsatisfied or very unsatisfied, 2 = neither satisfied

nor unsatisfied, 3 = satisfied, and 4 = very satisfied). Using these alternative measures of the dependent variables, all results were qualitatively similar in terms of the signs or significance levels of the coefficient estimates (see online Appendix Table A6).

Lastly, we calculated robust standard errors that adjusted for clustering at the community-level instead of the individual-level. As shown in online Appendix Table A7, despite minor changes in the point estimates of the coefficients and standard errors, the substantive results were not altered.

Testing Mechanisms

First, we examined whether female directors, due to their gendered policy preferences, managed to establish or maintain community facilities that promoted local residents' welfare and health. As shown in online Appendix Table B1, contrary to our expectations, several of these community facilities were more likely to be available in communities with male rather than female directors, regardless of rural-urban location or survey wave. As an exception, in rural areas in 2010, senior centers were more accessible in female-directed communities than in male-directed communities.

For each type of facility, we estimated a fixed-effects linear probability model of its presence (= 1) or not (= 0) in the community over the 2010–2014 period (i.e., path *a* in Figure 1). All the models controlled for community directors' sociodemographic characteristics, communities' demographic and economic conditions, community fixed effects, and time fixed effects. As shown in online Appendix Table B2, we found little evidence of a positive association between female community directorship and access to any type of facility in rural or urban areas. The only significant association with a female director was reduced access to primary schools in rural communities. These results indicate that community facilities (or public goods) were not a plausible mechanism.

We next tested respondents' experience of gender discrimination in the past year as a potential mediator. We started the mediation analysis with mental health outcomes among rural women and urban men, because the health benefits from living in female-directed communities were the most robust. Our analysis (see online Appendix Table B3) revealed that for urban men, the gender of community director was not associated with gender discrimination in the past year (i.e., insignificant path *a*), which in turn was unrelated to their K-6 scores (i.e., insignificant path *b*). For rural women, gender discrimination in the past year was not associated with CESD-8 (i.e., insignificant path *b*). We found significant paths *a* and *b* with respect to rural women's K-6 scores and proceeded to complete the mediation analysis.

Figure 2 depicts the estimated pathways linking the gender of community director to rural women's K-6 scores through their experience of gender discrimination. The direct effect of female community directorship on rural women's K-6 scores was estimated to be $-.556$ (path *c'*). Living in communities with female directors was associated with a lower likelihood of experiencing gender discrimination in the past year (path *a* = $-.046$). Having experienced gender discrimination in the past year was associated with a higher K-6 score (path *b* = 1.682); that is, poorer mental health. The indirect effect of female community

directorship on rural women's K-6 scores through experience of gender discrimination was estimated to be $-.077$ (the product of a and b , or $-.046 \times 1.682$). This indirect effect accounted for 12.2% ($\frac{-.077}{-.077 - .556} \times 100$) of the total effect.

As a robustness check, we also performed mediation analysis following the KHB method (Karlson, Holm and Breen 2012). Again, we used nonparametric bootstrap with 2,000 replications to obtain standard errors. The KHB method calculated the indirect effect as the difference between path c and path c' , yielding an estimate of $-.191$, which accounted for 25.6% of the total effect. In sum, results from both of these mediation methods show that a nontrivial proportion of the effect of female leadership on rural women's mental health is through a reduction in gender discrimination against their female constituents.

DISCUSSION

Using nationally-representative data from China, we conducted a longitudinal study of the association between women's political leadership in community committees in 2010 and 2014 and local residents' health and subjective well-being measured contemporaneously or two years later. Our study yielded several important findings. First, we found that in both rural and urban communities, female committee directors had higher levels of human capital than their male peers and showed no significant disadvantage in their political capital relative to male directors. Further, women were unlikely to be elected as directors of community committees in rural areas (6% of communities), whereas this pattern was reversed in urban locations (almost 65% of committees). Thus, in rural locations—where community committees wield greater power and social networks matter—men maintain dominance in leadership positions despite having lower levels of human capital than women. One interpretation is that in urban areas—where local committees exert little power over constituents' work and home lives—men are less interested in governing (Howell 2006). Alternatively, it could be that women have difficulty overcoming gender barriers and rising to influential leadership positions in patriarchal contexts without gender quotas, such as China. In this case, only the most experienced or most capable women are elected to community leadership positions. These findings suggest a pervasive bias against women at the local level, despite the Chinese Communist Party's decades-long campaign promoting gender equality.

Second, we found evidence of a positive relationship between female community leadership and two out of four measures of local residents' health. Net of a range of individual-, family-, and community-level characteristics, adult residents who lived in female-directed communities had lower scores on two measures of mental health disorders compared with those who lived in male-directed communities. These associations were most robust among rural women but also observed among rural and urban men. These findings are among the few that highlight the mental health benefits of women's political representation. In our sample, rural women are especially vulnerable to poor mental health, and other studies find they have the highest suicide rates (Yip et al. 2005). Therefore, our results are encouraging from a public policy perspective in that they suggest a potential benefit to population health of promoting female community leadership. Nevertheless, we note that if the most

experienced or capable women are elected, our estimates would be biased upward and represent the upper bound of the mental health effects of female community leaders.

We found no evidence of a relationship between female community leadership and local residents' self-rated health and life satisfaction. Recent research suggests that Chinese adults tend to rate their general health status and life satisfaction on the basis of socioeconomic resources accumulated over time, such as education and household wealth, rather than their current income (Xu and Xie 2017). Longer periods of exposure to female community leadership may therefore be needed to improve these health indicators.

Third, we found that the mental health benefit of living in female-directed communities for rural women was partially explained by reduced personal experience of gender discrimination. This result supports the view that female leadership fosters ideational change that lowers discrimination against women. This mechanism applied to K-6, a measure of general mental disorders, but not to CESD-8, a measure specific to depression, suggesting that gender discrimination has broader influence on overall psychological distress or other types of mental conditions than depression alone.

While these analyses provide novel insights into women's community leadership, further investigation is warranted. The measure of gender discrimination in the CFPS is crude and does not specify which forms of gender discrimination have been reduced. Furthermore, measures of personal gender discrimination are often underreported, particularly because many do not consider themselves victims of discrimination (Kaiser and Major 2006).

Unlike studies of women's community leadership in India, we found no evidence that female leaders increased the provision of local public goods and services compared to male leaders. This is consistent, however, with Yao and You's (2018) study in China, which found that a higher percentage of female party membership at the county level did not predict an increase in public spending on education. Nevertheless, we cannot rule out public goods provision as a potential mechanism linking women's political representation to population health in China. It may require a significantly longer observation period to build such infrastructure than the four-year observation window we analyzed.

While we assert that our study is theoretically and methodologically valuable, we acknowledge its limitations. In particular, we cannot fully address the problem of endogeneity. Nevertheless, our analyses do control for unobserved time-constant selection at the individual- and community-levels with fixed effects and inverse probability weighting. This would account for factors such as female leaders having more knowledge about women's health or greater preferences for gender equality compared to male leaders, as long as such differences remain time-constant during the study period. Similarly, it would account for unobserved differences across communities in levels of gender discrimination or adult health at the start of the observation period because our statistical inference is based on longitudinal changes in gender discrimination and adult health.

We cannot address several additional types of unobserved heterogeneity. One issue is selective migration. For example, healthier women could migrate from male-directed to female-directed communities; as a result, unhealthy women are left behind in male-directed

communities, leading us to overestimate the effect of women's leadership on health. In addition, we cannot fully control for unobserved time-varying factors. For example, if female leaders' job performance systematically improved over time relative to male directors' performance, and there are no measures of job performance in the data, this would bias our estimates.

Finally, the CFPS measures and data are not free from measurement error. Our four measures of health are self-reported and susceptible to social desirability and other reporting biases. Measurement error across survey waves is another problem for all longitudinal studies. For instance, in our lagged analysis of CESD-8 and self-rated health, unobserved leadership changes may have occurred in the 2-year time period. If male leaders were replaced by better-performing female leaders a year later, and this change is not captured in the data, we would erroneously attribute constituents' improved mental health to male directors, which would bias our estimates toward zero. Unfortunately, without more detailed information on the timing of community elections, we are unable to calibrate the scope or direction of this error.

Despite these limitations, our study contributes to a relatively new area of inquiry in research on population health and expands our understanding of women's political representation and adult well-being. In the Chinese setting without gender quotas, our results suggest that considerable barriers remain for women to participate in local politics, particularly in rural areas, and to exercise their power local governance, particularly in urban areas (Howell 2006). Nevertheless, once elected in rural areas, women's leadership is positively associated with constituents' mental health, particularly among women. This, in turn, provides additional scientific evidence and argument for advocating and promoting women's leadership with or without gender quotas.

Our findings also point to multiple policy recommendations. With respect to increasing women's local political representation, dissemination of the positive benefits of women's leadership has the potential to trigger further ideational change, including reducing gender stereotypes and discrimination and inspiring young women to become future leaders. In addition, the government might enhance organizational practices that include and promote women, as well as invest in training programs that develop women's leadership skills and support female leaders' effectiveness, for example. Finally, opportunity exists to integrate the lessons learned through female governance into health sector policies. In sum, though there are many possible paths forward, women's political representation in China deserves greater attention. Chinese women need political empowerment to hold up half the sky, and such empowerment may well contribute to population health and well-being.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Figure 1.
Path diagram for mediation analysis of gender of community director and health and life satisfaction

Figure 2.

Path coefficients from mediation analysis of female community director and non-specific psychological distress (Kessler-6 scale) through the experience of gender discrimination for rural women subsample ($N = 18,062$). * $p < .05$; ** $p < .01$; *** $p < .001$.

Table 1.

Characteristics of communities in the China Family Panel Studies.

	2010				2014			
	Rural communities led by		Urban communities led by		Rural communities led by		Urban communities led by	
	Women	Men	Women	Men	Women	Men	Women	Men
<i>Director's characteristics</i>								
Age (mean)	47.7	47.7	43.7	47.0***	47.9	49.1	44.7	45.9
Education (%)								
<= Middle school	8.7	51.2***	2.9	12.8***	38.9	47.6	.8	9.7**
High school	69.6	36.7	33.6	48.7	38.9	34.8	27.6	30.6
>= College	21.7	12.1	63.6	38.5	22.2	17.6	71.7	59.7
Political status (%)								
Communist party	87.0	83.5	86.4	88.5	88.9	84.4	92.9	94.4
Democratic parties	13.0	9.0	8.6	6.4	.0	2.2	.8	2.8
None	.0	7.5	5.0	5.1	11.1	13.4	6.3	2.8
<i>Community's characteristics</i>								
Last election year (%)								
This year	17.4	11.6	5.0	2.6	27.8	17.6	10.2	19.4
A year ago	26.1	14.2	35.0	19.2	22.2	35.9	21.3	23.6
Two years ago	43.5	46.8	36.4	46.2	33.3	15.0	33.9	31.9
Three years ago	8.7	20.7	16.4	21.8	11.1	25.1	27.6	15.3
Four or more years ago	4.4	6.7	7.1	10.3	5.6	6.4	7.1	9.7
Population size (mean)	4,546	2,405*	7,401	9,213	2,898	2,730	7,993	10,168
Median annual family net income (mean)	26,955	19,515*	43,759	32,988***	45,651	30,930**	60,087	55,748
<i>N of communities</i>	23	387	140	78	18	359	127	72
% women and men leaders	5.6	94.4	64.2	35.8	4.8	95.2	63.8	36.2

* $p < .05$

** $p < .01$

*** $p < .001$ in t-tests or Chi-squared tests for the differences between male- and female-directed communities.

Table 2.

Descriptive statistics of the individual-level dependent variables

Outcome variables	Rural women			Rural men			Urban women			Urban men		
	Mean	SD	(N)	Mean	SD	(N)	Mean	SD	(N)	Mean	SD	(N)
Kessler-6												
(range: 0–24) ^a												
2010	3.6	4.2	(10,327)	2.9	3.7	(9,864)	2.8	3.6	(4,943)	2.5	3.5	(4,547)
2014	3.7	4.2	(8,146)	3.0	3.8	(8,540)	3.2	3.9	(3,139)	2.6	3.5	(2,900)
CESD-8												
(range: 0–24) ^a												
2012	6.2	4.1	(8,164)	5.1	3.9	(7,537)	5.0	3.8	(3,497)	4.1	3.4	(3,149)
2016	5.9	4.1	(6,820)	4.9	3.9	(7,031)	5.0	4.0	(2,442)	4.1	3.7	(2,278)
Self-rated health												
(range: 1–5) ^b												
2012	2.6	1.3	(8,543)	2.9	1.2	(8,086)	2.6	1.1	(3,568)	2.8	1.1	(3,244)
2016	2.8	1.3	(7,146)	3.0	1.2	(7,405)	2.8	1.1	(2,519)	2.9	1.1	(2,341)
Life satisfaction												
(range: 1–5) ^b												
2010	3.5	1.0	(10,315)	3.5	1.0	(9,867)	3.5	1.0	(4,938)	3.4	1.1	(4,543)
2014	3.8	1.0	(8,145)	3.8	1.0	(8,537)	3.8	1.0	(3,140)	3.8	1.0	(2,901)

^aHigher scores indicate worse mental health.

^bHigher scores indicate better health.

Table 3.

Descriptive statistics of the individual-level independent variables

	Rural		Rural men	Urban women	Urban men
Age (years; mean)	45.8		47.0	46.8	47.3
Marital status (%)					
Single	7.8		12.6	9.4	12.9
Married	84.0		82.2	79.5	81.9
Divorced/widowed	8.2		5.3	11.1	5.1
Education (%)					
No school	42.9		24.6	16.9	9.8
Primary school	23.1		28.0	13.7	12.4
Middle school	23.7		32.3	28.9	31.2
>= High school	10.3		15.2	40.5	46.6
Smoking (%)					
No	96.7		39.9	96.4	45.8
Yes	3.3		60.1	3.6	54.2
Alcohol consumption (%)					
No	96.9		69.7	97.2	71.4
Yes	3.1		30.4	2.8	28.6
Net annual family income per capita (RMB; mean)	8,270		8,597	17,110	17,627
Experience of gender discrimination in the past year (%)	5.3		2.5	5.1	2.0
Survey wave (%)					
2010	55.9		53.6	61.2	61.1
2014	44.1		46.4	38.8	39.0
N of person-years	18,497		18,419	8,085	7,448

Table 4.

Fixed-effects regression estimates of the associations between gender of community director and residents' health and life satisfaction

Key independent variable	Dependent variables		
	K-6	CESD-8	Self-rated health
<i>Panel A: Rural women subsample</i>			
Female director (Ref: male)	-.747** (.260)	-.867** (.269)	.055 (.074)
Bonferroni-adjusted <i>p</i> -value	.016	.001	1.000
N of person-years	18,473	14,984	15,689
<i>Panel B: Rural men subsample</i>			
Female director (Ref: male)	-.255 (.251)	-.602* (.269)	.063 (.084)
Bonferroni-adjusted <i>p</i> -value	.309	.025	.458
N of person-years	18,404	14,568	15,491
<i>Panel C: Urban women subsample</i>			
Female director (Ref: male)	-.335 (.240)	-.201 (.250)	.004 (.062)
Bonferroni-adjusted <i>p</i> -value	.652	1.000	1.000
N of person-years	8,082	5,939	6,087
<i>Panel D: Urban men subsample</i>			
Female director (Ref: male)	-.610* (.257)	.080 (.232)	.051 (.070)
Bonferroni-adjusted <i>p</i> -value	.072	1.000	1.000
N of person-years	7,447	5,427	5,585

Notes: Ref = reference category. Robust standard errors are in parentheses. All models control for respondents' demographic and socioeconomic characteristics, community directors' sociodemographic characteristics, community's characteristics, individual fixed effects, community fixed effects, and time fixed-effects.

* $p < .05$

** $p < .01$

*** $p < .001$.

Table 5.

Comparing coefficient estimates associated with the gender of community director across subsample models.

	Dependent variables			
	K-6	CESD-8	Self-rated health	Life satisfaction
<i>Panel A: Rural-urban difference in women subsample</i>				
$\beta_{rural} - \beta_{urban}$	-.412	-.666	.051	-.084
Z score	-1.163	-1.812	.526	-.860
P-value	.245	.070	.599	.390
<i>Panel B: Rural-urban difference in men subsample</i>				
$\beta_{rural} - \beta_{urban}$	.355	-.682	.011	-.060
Z score	.987	-1.921	.103	-.633
P-value	.324	.055	.918	.527
<i>Panel C: Gender difference in rural subsample</i>				
$\beta_{women} - \beta_{men}$	-.492	-.265	-.008	-.026
Z score	-1.361	-.696	-.070	-.267
P-value	.174	.486	.944	.790
<i>Panel C: Gender difference in urban subsample</i>				
$\beta_{women} - \beta_{men}$	.275	-.281	-.048	-.002
Z score	.780	-.823	-.511	-.024
P-value	.435	.410	.610	.981

Notes: Ref = reference category. Robust standard errors are in parentheses. All models control for respondents' demographic and socioeconomic characteristics, community directors' sociodemographic characteristics, community's characteristics, individual fixed effects, community fixed effects, and time fixed-effects.

* $p < .05$

** $p < .01$

*** $p < .001$.