

Smoking cessation subjects in Beijing communities were isolated at home during the COVID-19 pandemic—Study on the influence of smoking behaviour and willingness to quit smoking

Qianying Jin

Capital Medical University

Kun Qiao

Capital Medical University

Han Liu

Capital Medical University

Hanqiao Ma

Capital Medical University

Xinyuan Bai

Capital Medical University

Xinran Qi

Capital Medical University

Xingming Li (✉ libright2003@163.com)

Capital Medical University

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Abstract

Background: To understand the situation about quarantine of smoking cessation participants in Beijing communities during the period of COVID-19, and to explore this pandemic's impacts on people's smoking behaviours, relapse thoughts, and willingness to quit smoking among quitters, to provide information and guidance on quit smoking during the normalised period of epidemic prevention and control.

Methods: Before the coronavirus outbreak, one-to-one interviews were used, and during the epidemic period, one-to-one question-and-answer telephone surveys were used. The contents of the survey included the hours of staying at home, psychological and emotional state, tobacco use, and willingness to quit smoking. This study adopted a 1:1 propensity score matching method, with education level, whether to take smoking cessation drugs, and whether to participate in regular follow-ups as matching conditions to control the mixed influence of the content of smoking cessation intervention services on the analysis results before the pandemic. After matching, the chi-square statistics, Fisher exact probability method, and the Spearman rank correlation test were used to analyse factors such as changes in smoking behaviour, hours of staying at home, and mental states.

Results: A total of 197 pairs were successfully matched, of which 197 cases had successfully quit smoking before the epidemic, and 197 cases had not completely quit smoking. The changes in smoking volume before and during the epidemic of the incomplete quitters were affected by anxiety, calmness, mental and emotional states similar to usual, other reasons for smoking such as addiction and habits, and their willingness to quit during the epidemic (all $P < 0.05$). The changes in daily smoking volume before and after the epidemic among the ex-smokers were statistically significant in the distribution of relapse thoughts, anxiety, depression, and other reasons for smoking, such as depression and boredom, idle pastimes, addiction and habits ($P < 0.05$). Among the people who did not completely quit smoking before the epidemic, the idea of relapse was affected by depression, calm mental and emotional state, reasons for smoking that relieve boredom and leisure, and the willingness to quit smoking during the epidemic ($P < 0.05$). And there is a negative correlation between the willingness to quit smoking during the epidemic and the time at home each day ($r_s = -0.237$, $P < 0.05$).

Conclusions: During the COVID-19, the time at home of the test patients who quit smoking has a certain influence on their willingness to quit smoking. The psychological and emotional changes and idleness at home have a greater impact on the changes in their smoking behaviour and relapse thoughts. It is recommended that family members provide more support and encourage and supervise to help smokers reduce smoking. In the period of normalization of epidemic prevention and control, the smoking cessation services provided should guide the quitters on smoking cessation behavioural therapy, as well as guidance on the relief of negative emotions, and help quitters to break the relationship between existing smoking habits, negative emotions, and environmental temptation situations.

Trial registration: The study was registered on the official website of the Chinese Clinical Trial Registry on August 6, 2019, with the registration number ChiCTR1900024991.

Background

Since December 2019, a new type of coronavirus pneumonia (COVID-19) has broken out globally. In a short period, the epidemic has developed rapidly. To prevent the further spread of the pandemic, the Chinese government and the Beijing municipal government have called on the public to voluntarily isolate themselves at home. Before the outbreak, our research team has carried out smoking cessation interventions in some communities in Beijing^[1-2]. Among them, 685 tobacco-dependent patients in Beijing communities are trying to quit smoking, and some have successfully quit smoking. Quitting smoking is a complicated process. The success of smoking cessation is related to many factors such as different smoking status, motivation to quit, and the temptation situation during smoking cessation^[3]. Home self-isolation and psychological and emotional changes several months after the outbreak of the epidemic may affect the smoking cessation behaviour, willingness to quit, and their psychological mood of smokers, and may even cause those who have quit smoking to relapse. However, there is currently a lack of relevant research on the impact of the new crown pneumonia epidemic on smokers. Therefore, to explore the impact of the new crown pneumonia epidemic on the smoking cessation behaviour of smoking cessation test patients, this study intends to use the Propensity Score Matching (PSM) method to control the influence of smoking cessation service-related factors such as drug use and follow-up on the willingness and behaviour of smoking cessation. After matching, we will further analyse the relationship between changes in smoking behaviour and willingness to quit smoking of smoking cessation test patients in Beijing community during the new coronavirus pneumonia epidemic (the epidemic period in this study refers to February to April 2020) and their home time and psychological state during the epidemic, in order to provide a reference for optimizing smoking cessation services and improving smoking cessation guidance strategies under the normalized environment of epidemic prevention and control.

Materials And Methods

1. Research objectives

This research project is a key research and development program of China in 2017, and the research object is 685 patients with tobacco dependence who were successively enrolled in the group to receive smoking cessation intervention services from December 2018 to December 2019. Through the launch of smoking cessation publicity activities in 19 communities in Beijing, smokers who are willing to quit smoking were recruited, and smokers who signed up for the activity were screened. The investigators and doctors in the smoking cessation clinic conducted one-to-one face-to-face questionnaire surveys, carbon monoxide blowing tests, and lung function tests on smokers included in the study. Based on the examination results, the doctor formulated a specific plan for smoking cessation intervention for each research subject, including whether to take smoking cessation drugs, the daily dose of drugs, the schedule of daily smoking reduction, and precautions. Throughout the research process, the subjects will receive a three-month smoking cessation intervention service and six-month follow-up. From March 2020 to April 2020, the research team recruited and trained telephone investigators to learn about the current smoking status and willingness to quit smoking of study subjects during the epidemic period through one-to-one telephone follow-up.

Throughout the research process, the inclusion criteria of the research subjects were: ≥ 18 years old and above; ≥ Residents of Beijing community; ≥ Smokers, including regular smokers (referring to smoking more than 1 cigarette a day, continuous or cumulative 6 months^[4]), occasional smokers (referring to smoking cigarettes more than 4 times a week, but less than one cigarette per day on average); ≥ Can communicate fluently and be willing to be investigated. The exclusion criteria are: < 18 years old; < non-smokers; < not able to communicate fluently; < reluctant to be investigated. The final telephone survey followed up 565 smoking cessation subjects. In this study, "successfully quit smoking" refers to the rate of quitting smoking at 7 days, that is, the subjects self-reported that they stopped smoking ≥ 7d^[5], and "did not completely quit smoking" refers to people who are still smoking at the time of the survey, including those who have quit smoking but relapse.

2. Research content

The pre-epidemic survey included: (1) Socio-demographic information, including information such as age, gender, marital status, education level, average monthly income level, nature of household registration, job type, etc.; (2) Tobacco use, including daily smoking, smoking age, etc.; (3) Nicotine Dependence Assessment Scale (FTND); (4) Assessment scale of willingness to quit smoking.

The contents of the telephone survey during the epidemic include: (1) In the past two weeks, what was the daily time spent at home? The answers include almost all day, 80-90% of the time, 50-80% of the time, and less than 50% of the time; (2) Which words can describe the psychological feelings brought about by the recent epidemic? The answers include doubts, anxiety, panic, depression, calm, and almost as usual. Among them, the "calm" emotional state refers to the research subject's ability to think rationally about the epidemic, and "almost as usual" refers to the attitude of indifferent and indifferent; (3) The smoking behaviour of the subjects who quit smoking during the period, including the daily smoking amount and whether it is due to the epidemic regenerate the idea of wanting to smoke (if you have quit smoking, then relapse); (4) Nicotine Dependence Assessment Scale (FTND); (5) If you are still smoking, the main reason for smoking behaviour, the answer includes: refreshing, relieving sorrow and boredom, leisure time, social entertainment, imitating curiosity, elder influence, stress relief, other habits such as smoking addiction, etc.; (6) Smoking cessation willingness assessment scale. (See the supplementary file for the full contents of the questionnaire.

In the Fagerstrom Test of Nicotine Dependence (FTND), the scale consists of 6 items, and each item is scored from 0 to 3 points, representing the least degree of dependence on the heaviest degree of dependence. The degree of nicotine dependence is judged according to the total score of 6 items, which can be divided into 3 degrees of dependence: mild: 0-3 points; moderate: 4-6 points; severe: 7 points or more. The Cronbach's a coefficient of the Chinese version of the Nicotine Dependence Scale is 0.658^[6], indicating that its internal consistency is relatively reliable. The smoking cessation willingness assessment scale in this study was designed by the members of the research team to evaluate the study subjects' willingness to quit smoking. The scale contains ten items, using Likert's 5-point scoring standard, "very non-conforming" is rated as 1 point, "comparatively non-conforming" is rated as 2 points, "general" is rated as 3 points, and "relatively consistent" is rated as 4 points and "very consistent" is rated as 5 points. The higher the score, the stronger the willingness to quit smoking. In this study, by calculating the total score of each research object, it was divided into very low willingness to quit smoking (total score < 10 points), relatively low (10 points ≤ total score < 19 points), and general (20 points ≤ total score < 29 points), relatively high (30 points ≤ total score < 39 points), very high (total score ≥ 40 points) five groups. After testing, the Cronbach's a coefficient of the scale is 0.805, the KMO value is 0.895, and the Bartlett value is 872.096 ($P < 0.001$). After the maximum variance is rotated, the four factors are extracted and the cumulative explanation is 86%, indicating that the scale has good reliability and validity^[1-2].

3. Statistical analysis

This study uses IBM SPSS Statistics 25.0 for data propensity score matching and statistical analysis. Propensity Score Matching (PSM) is a statistical method commonly used to process observational research data. This method is used to reduce the influence of data bias and confounding variables in the study, so as to affect the experimental group and the control group make a more reasonable comparison. It is suitable for two situations. The first is the re-observation study, where the number of individuals that can be directly compared between the control group and the test group is very small; the second is that there are more parameters to measure individual characteristics and select the same or similar parameters comparison is more difficult. This research is the second case. In this study, it was divided into two groups: those who had quit before the epidemic and those who had not completely quit before the epidemic. Nearest neighbour matching (NNM) was used, based on the propensity score of the subjects in the groups. Based on the propensity score of the study subjects in the group who had quit smoking before the epidemic, the subjects who did not completely quit smoking before the epidemic were searched for the object closest to the score, and matched 1:1. The calliper value of the propensity score is set to 0.02. The matching process uses whether or not to quit smoking before the epidemic as the dependent variable. The matching conditions include education level, whether to take smoking cessation drugs, and whether to receive regular follow-up, etc. Finally, 197 pairs were successfully matched.

In addition, this study also used descriptive analysis methods to calculate the overall distribution of home time, psychological and emotional state, smoking behaviour, and willingness to quit smoking among the smoking cessation subjects during the epidemic. All measurement data used Kolmogorov-Smirnov test for normality test; non-normal distribution variables were represented by $M (P_{25}, P_{75})$, and Mann-Whitney rank sum test was used for comparison between groups. Categorical variables are expressed in frequency (%). Chi-squared test, rank sum test and Fisher exact probability method were used to analyze the correlation between home isolation time, psychological and emotional status, reasons for smoking, changes in smoking volume before and during the epidemic, willingness to quit and other factors of the matched population who quit smoking. Spearman rank correlation was used to analyse the correlation between the study participants' willingness to quit smoking and their daily home time during the epidemic. The difference was statistically significant when $P < 0.05$.

4. Analyse ideas

The success of smoking cessation is affected by many factors, including different smoking status, motivation to quit, the availability of appropriate techniques and methods, and the temptation situation during smoking cessation^[3]. After the outbreak of the new crown virus pneumonia, the results of the telephone follow-up suggest that the distribution of daily smoking of the test patients during the epidemic and the distribution before the epidemic is statistically significant ($P < 0.001$), are shown in Table 1. Among them, the daily smoking of 159 smoking patients changed from before the epidemic, as shown in Table 2. This reminds us that during the epidemic, long-term self-isolation of study subjects at home and changes in their psychological and emotional state in the face of the epidemic may affect the smoking cessation behaviour of the patients who quit smoking.

However, in this study, the subjects had received three-month smoking cessation services and a six-month follow-up, and the time overlapped with the epidemic period. Among them, the use of smoking cessation drugs, regular follow-up, and other factors may also affect the process of smoking cessation, as shown in Figure 1. To control the influence of related confounding factors, indicators with discrepancies in demographic information and the main content of smoking cessation intervention services are used as matching conditions for propensity score matching. After matching, the relevant factors can be controlled, and then the relationship between home time, relapse thoughts, psychological emotions and changes in smoking behaviour can be further analyzed.

5. Ethical approval

The study protocol is performed in accordance with the relevant guidelines. This study has been approved by the Medical Ethics Committee of Capital Medical University (Z2019SY007), and an informed consent form has been signed with the subjects before the investigation. Additionally, this study has been registered on the official website of the China Clinical Trial Registration Centre (ChiCTR1900024991).

Results

1. Basic information of the subjects who quit smoking before and after matching

Among the smoking cessation subjects who received the telephone follow-up this time, the majority were men (518,91.7%), and the proportion of those aged 60 and over was the highest (226,40.4%); in terms of marital status, most were married (498, 88.3%); the education level is mostly junior high school graduation (300,53.2%); most of the survey respondents have retired (242, 43.2%).

After matching, a total of 394 study subjects were included, of which 197 had not completely quit before the epidemic, and 197 had successfully quit before the epidemic. There was no statistically significant difference in the distribution of gender, age, marital status, education level, and work status between the two groups (all $P > 0.05$), see them in Table 3.

2. Distribution of home time, psychological and emotional state, and smoking behaviour during the epidemic

During the epidemic, 64.3% of survey respondents said that they lived at home almost all day. 346 respondents said their mentality during the epidemic was the same as usual, and 207 said their emotional state was relatively calm and could view the epidemic nationally. However, 22.1% of the respondents felt that they were anxious, depressed, panic, and suspicious. 17.9% of smoking cessation subjects said that they had the idea of smoking again during the new crown pneumonia epidemic. The difference in the distribution of relapse thoughts between the two groups was statistically significant ($P < 0.05$). During the epidemic, the top three reasons that prompted the quit smoking subjects to continue to smoke were other reasons such as addiction or habit, idle pastime, and relief from depression. This may be related to the long-term home status during the epidemic. 72.4% of smoking cessation test patients expressed their willingness to continue to quit smoking, see them in Table 4.

After the outbreak, the scores of the smoking cessation test patients' willingness to quit the assessment scale (36.98 ± 13.67) did not change significantly compared with before the epidemic (37.02 ± 10.20), and the willingness to quit smoking was slightly decreased. During the epidemic, smoking cessation subjects are still receiving the cessation services provided by the project team, including the provision of smoking cessation drugs, the promotion of smoking cessation knowledge, and regular follow-ups. In order to have a clearer understanding of the impact of the epidemic on the smoking cessation behaviour of smoking cessation subjects, the method of propensity scoring was used to control the influence of various factors for further analysis.

3. Analysis of the influence of home conditions of smoking cessation subjects on smoking

During the epidemic, the smoking behaviour of quit smoking subjects changed, which was specifically reflected in the decrease or increase in daily smoking. The analysis results show that for the smoking cessation test patients who did not completely quit before the epidemic, the changes in their smoking volume were mainly related to anxiety, calmness, mental and emotional state similar to usual, smoking addiction and habits and other reasons for smoking, and their willingness to quit during the epidemic. The distribution difference is statistically significant ($P < 0.05$), see Table 5. For test patients who had quit smoking before the epidemic, other reasons for smoking such as relapse thoughts, anxiety, depression, sorrow and boredom, idle pastime, addiction, and habits, etc., affected the changes in smoking volume, and the distribution difference was statistically significant ($P < 0.05$). This reminds us that the impact of the epidemic on quitters is mainly psychological and emotional, and changes in mood further cause changes in smoking behaviour. In addition, the higher the willingness to quit smoking, it may play a positive role in maintaining smoking cessation status.

4. Analysis of the influence of the home condition of smoking cessation subjects on the idea of relapse

Among the people who did not completely quit smoking before the epidemic, the distribution of relapse thoughts was affected by depression, calm psychological and emotional state, reasons for smoking to relieve depression, and leisure time, and the willingness to quit smoking during the epidemic. The distribution difference was statistically significant ($P \text{ all } < 0.05$), see Table 6. Among the people who had quit smoking before the epidemic, there was no

statistically significant difference in the distribution of relapse thoughts in daily home time, different psychological and emotional states, different reasons for smoking, and willingness to quit smoking ($P>0.05$). Among them, a calm emotional state is conducive to controlling the relapse thoughts of quitters, while depression, depression and boredom, and leisure time may play a positive role in the generation of relapse thoughts.

5. Correlation analysis of home conditions and willingness to quit smoking

The results of correlation analysis showed that among the people who did not completely quit smoking before the epidemic, there was a negative correlation between the willingness to quit smoking and the time at home during the epidemic period ($-1<rs<0$, $P<0.05$), as shown in Table 7. The two are weakly correlated. As the time spent at home each day increases, the willingness to quit smoking among those who have not completely quit has increased, but among people who have quit smoking, there is no correlation between these two.

Discussion And Suggestions

At the beginning of 2020, the novel coronavirus pneumonia outbreak broke out. In order to prevent the further spread of the epidemic, at the call of the Chinese government and the Beijing municipal government, the public voluntarily self-quarantine at home based on the principle of "no rush, no visits, no gatherings". Previously, smoking cessation subjects who have received 3 to 6 months of smoking cessation intervention services are trying to quit smoking and have partially quit smoking. The sudden epidemic may change their motivation, psychological state, and willingness to quit smoking of smokers, which has an impact on their smoking cessation behaviour. This study used propensity score matching method to analyze the relationship between smoking behaviour, relapse thoughts, willingness to quit and other changes in smoking cessation subjects, and their home isolation time and psychological and emotional state during the epidemic, in order to provide a reference for further optimizing smoking cessation services and perfecting smoking cessation guidance strategies in the period of normalization of epidemic prevention and control.

In this study, 74.7% of smoking cessation subjects stayed at home for more than 80% every day, or even stayed at home all day. Although the situation of the epidemic is severe, smokers who quit smoking generally have a better mentality, and their self-reports are almost normal or relatively calm. 22.1% of the survey respondents said they have other emotions. There was no statistically significant difference in the distribution of daily smoking changes and relapse thoughts among the smoking cessation subjects in different home time, but there was a negative correlation with the changes in the willingness to quit smoking in the non-quit smoking population during the epidemic. The longer the stay at home, the stronger the willingness to quit smoking among those who have not completely quit. This may be due to the fact that the study subjects spent most of their time at home with their family members. Family members' supervision of smoking behaviour and support for smoking cessation, or the prohibition of smoking at home, have played a positive role in enhancing the willingness of smoking cessation subjects to quit smoking. Therefore, it is very necessary to create a "smoke-free family" environment, and family members should give quitters the greatest support and encouragement to help them maintain a quitting state and quit smoking successfully. On the other hand, during the stay at home, the quitting subjects had significantly less contact with their relatives and friends and other smoking peers, and reduced social smoking behaviours. They were supplemented with smoking cessation services such as smoking cessation drugs, regular follow-ups, and knowledge about tobacco hazards. Studies have pointed out that the rate of social smoking behaviours in smoking cessation groups when they are with friends is significantly lower than that in the group that fails to quit smoking^[7]. Smoking quitters are prone to have a strong craving for cigarettes due to the induction of visual cues when their peers smoke^[8]. This also suggests that our smoking companions are inextricably linked to the occurrence of smoking behaviour, and the isolation at home during the epidemic has weakened this relationship. Therefore, it is recommended that smoking cessation services help quit smoking subjects establish correct cognitive attitudes to coping with social smoking behaviours, and provide skills and methods to cope with "passing cigarettes" and "persuading smoking" behaviours in social situations to help quitters maintain quit smoking status.

In this study, the psychological and emotional states of anxiety and depression affect the smoking behaviour and relapse thoughts of the patients who quit smoking. During the telephone follow-up process, some smokers reported that they had negative psychological emotions such as anxiety and depression after the outbreak, which led to the behaviour of continuing to smoke. Studies have pointed out that many smokers regard smoking as a way to increase positive emotions^[9], which can improve mood and make thinking quicker. When the smoker is depressed, the effect of smoking behaviour will be further expanded^[10], which is caused by the misunderstanding of the nicotine addiction mechanism after tobacco ingestion by quitters. Therefore, health education should be carried out for smoking cessation subjects, to popularize knowledge about tobacco addiction, and to publicize the harm of tobacco. For patients who are trying to quit smoking and those who have successfully quit smoking, they should learn to use the correct emotional management methods and avoid tobacco use as a way to improve mood^[2]. In addition, due to the large amount of spare time at home during the epidemic, the main reasons for the smoking behaviour of ex-smokers have been to relieve anxiety and relieve boredom. Some unsuccessful quitters also said that their addiction and habits make them continue to smoke. Studies have pointed out that smoking is an exploration of the habit that occurs under a certain environmental temptation situation and has been repeatedly strengthened over a long period of time, such as unconsciously starting to smoke during a break or after getting up in the morning. Quitting smoking makes this behaviour habit terminated, and the environmental temptation situation becomes a risk factor for inducing relapse^[3]. During the stay at home, in a specific environment with ample rest time, the risk factor of the environmental temptation situation is magnified. It is recommended that smoking cessation behaviour therapy be adopted to break the connection between smoking behaviour and certain activities of quit patients, divert attention to cultivate new interests, and finally master the alternative behaviour of smoking, and establish a healthy lifestyle without smoking.

In conclusion, the outbreak of the epidemic has created a lot of spare time at home for smoking cessation subjects, and at the same time they have generated negative emotions such as anxiety and depression. It is recommended that family members provide more support and encouragement to quitters, help them increase their willingness to quit smoking, and supervise them reduce smoking behaviour and strengthen the environmental shaping of "smoke-free families". In the smoking cessation service, it can provide relevant content of smoking cessation behaviour therapy, methods to cope with social smoking behaviour. And guidance on the relief of negative emotions should also be provided to help quitters break the existing connection between smoking behaviour and context, cultivate new hobbies, and succeed and continue to quit smoking to feel a healthy life without smoke.

Declarations

Ethics approval and consent to participate: This study has been approved by the Medical Ethics Committee of Capital Medical University (Z2019SY007), and an informed consent form has been signed with the subjects before the investigation.

Consent for publication: The authors declare that they consent for publication.

Availability of data and materials: The datasets used and/or analysed during the current study available from the corresponding author on reasonable request.

Competing interest: The authors declare that they have no competing interests.

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Authors' Contributions: QJ and XL conceived the study design, conceptualized the ideas, and supervised the whole analytical procedure. KQ helps telephone surveys and data collection. HL and HM contributed to field surveys and data collection. XB and XQ also provide technical support for translation of manuscripts. All authors have read and approved the manuscript.

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Authors' information

Qianying Jin¹, Kun Qiao¹, Han Liu¹, Hanqiao Ma², Xinyuan Bai¹, Xinran Qi³, Xingming Li¹

¹School of Public Health, Capital Medical University

²School of Medical Humanities, Capital Medical University

³School of Nursing, Capital Medical University

The corresponding author: Xingming Li

You An Men Wai Xitoutiao 10, Beijing, China, 100069 (P.N.) Tel: 86-10-83911602/Fax: 86-10-83911602. libright2003@163.com

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Tables

Table 1 Comparison of daily smoking of patients who quit smoking before and during the COVID-19 pandemic

after the epidemic	0	1~	10~	20~	30~	Z	p
before the epidemic	0	142(91.6)	5(3.2)	6(3.9)	1(0.6)	1(0.6)	-8.476 <0.001
	1~	28(26.4)	75(70.8)	3(2.8)	0(0.0)	0(0.0)	
	10~	25(18.5)	11(8.1)	96(71.1)	3(2.2)	0(0.0)	
	20~	23(17.4)	10(7.6)	15(11.4)	83(62.9)	1(0.8)	
	30~	4(10.8)	0(0.0)	3(8.1)	2(5.4)	28(75.7)	

Table 2 Changes in daily smoking of patients who quit smoking before and during the COVID-19 pandemic

smoking volume change value (daily smoking after the epidemic-daily smoking before the epidemic)	frequency	percentage(%)
~-21	8	1.4
-20~	49	8.7
-10~	79	14.0
0	406	71.9
1~	14	2.5
10~	7	1.2
20~	2	0.4
total	565	100.0

Table 3 Basic information distribution before and after matching of smoking cessation patients under investigation during the COVID-19 pandemic

variable	before matching(n=565)			after matching(n=394)		
	did not completely quit smoking before the epidemic	quit smoking before the epidemic	<i>p</i>	did not completely quit smoking before the epidemic	quit smoking before the epidemic	<i>p</i>
Male(%)	378(92.2)	140(90.3)	0.524	187(94.9)	178(90.4)	0.121
Age[years, <i>M</i> (<i>P</i> ₂₅ , <i>P</i> ₇₅)]	54(47,63)	54(45,63)	0.947	54(47,63)	54(46,63)	0.397
marriage						
unmarried	25(6.1)	3(1.9)	0.127	14(7.1)	8(4.1)	0.272
married	355(86.8)	143(92.3)		170(86.3)	177(89.8)	
separated	3(0.7)	3(1.9)		1(0.5)	3(1.5)	
divorced	16(3.9)	3(1.9)		10(5.1)	5(2.5)	
widowed	10(2.4)	3(1.9)		2(1.0)	4(2.0)	
education						
primary school and below	30(7.3)	4(2.6)	0.026	8(4.1)	8(4.1)	1.000
junior high school	218(53.3)	82(52.9)		111(56.3)	111(56.3)	
college degree and above	161(39.4)	69(44.5)		78(39.6)	78(39.6)	
job						
production, operation, and clerical staff	49(12.1)	14(9.1)	0.170	28(14.4)	17(8.7)	0.127
business service personnel	37(9.1)	22(14.3)		18(9.3)	30(15.3)	
state agencies, enterprise personnel	419(10.1)	14(9.1)		25(12.9)	20(10.2)	
professional skill worker	36(8.9)	17(11.0)		12(6.2)	17(8.7)	
students, unemployed workers, etc.	68(16.7)	20(13.0)		37(19.1)	29(14.8)	
retirees	175(43.1)	67(43.5)		74(38.1)	83(42.3)	

Table 4 Distribution of home time, psychological and emotional state, and smoking behavior of smoking cessation patients during the COVID-19 pandemic

question	answer	did not completely quit smoking before the epidemic	quit smoking before the epidemic	total	χ^2	p
In the past two weeks, what was the daily time spent at home?	almost all day	206(65.6)	53(59.6)	259(64.3)	2.458	0.483
	80-90% of the time	30(9.6)	12(13.5)	42(10.4)		
	50%-80% of the time	37(11.8)	14(15.7)	51(12.7)		
	less than 50% of the time	41(13.1)	10(11.2)	51(12.7)		
Which words can describe the psychological feelings brought about by the recent epidemic? (multiple choice)	doubts	5(1.2)	1(0.6)	6(1.1)	—	—
	anxiety	57(13.9)	15(9.7)	72(12.7)		
	panic	12(2.9)	6(3.9)	18(3.2)		
	depression	23(5.6)	6(3.9)	29(5.1)		
	calm	159(38.8)	48(31.0)	207(36.6)		
	almost as usual	270(65.9)	76(49.0)	346(61.2)		
Do you regenerate the idea of wanting to smoke due to the epidemic(if you have quit smoking, then relapse)?	no	134(77.0)	81(92.0)	215(82.1)	8.973	0.003
	yes	40(23.0)	7(8.0)	47(17.9)		
If you are still smoking, the main reason for smoking behaviour(multiple choice)	refreshing	5(1.2)	0(0.0)	5(0.9)	—	—
	relieving sorrow and boredom	56(13.7)	3(1.9)	59(10.4)		
	leisure time	62(15.1)	5(3.2)	67(11.9)		
	social entertainment	17(4.1)	1(0.6)	18(3.2)		
	imitating curiosity	2(0.5)	0(0.0)	2(0.4)		
	stress relief	18(4.4)	2(1.3)	20(3.5)		
	other habits such as smoking addiction, etc.	90(22.0)	2(1.3)	92(16.3)		
Are you willing to quit smoking?	no	72(27.0)	7(36.8)	79(27.6)	0.865	0.352
	yes	195(73.0)	12(63.2)	207(72.4)		
Assessment of willingness to quit smoking before the epidemic	very low willingness	5(3.1)	3(9.4)	8(4.2)	3.153	0.515
	relatively low	2(1.3)	0(0.0)	2(1.0)		
	general	18(11.3)	2(6.3)	20(10.4)		
	relatively high	61(38.1)	12(37.5)	73(38.0)		
	very high	74(46.3)	15(46.9)	89(46.4)		
Assessment of willingness to quit smoking during the epidemic	very low willingness	12(6.2)	2(16.7)	14(6.8)	4.546	0.337
	relatively low	12(6.2)	2(16.7)	14(6.8)		
	general	21(10.8)	1(8.3)	22(10.6)		
	relatively high	36(18.5)	1(8.3)	37(17.9)		
	very high	114(58.5)	6(50.0)	120(58.0)		

Table 5 The influence of home time, psychological and emotional state, and reasons for smoking on smoking behavior during the COVID-19 pandemic (after matching)

question	grade	did not completely quit smoking before the epidemic							quit smoking before the epidemic					
		-35~	-10~	0	1~	10~	χ^2	p	-35~	-10~	0	1~	10~	
In the past two weeks, what was the daily time spent at home?	almost all day	5(4.9)	11(10.7)	86(83.5)	1(1.0)	0(0.0)	11.013	0.177	0(0.0)	0(0.0)	42(85.7)	3(6.1)	4(8.2)	
	80-90% of the time	2(11.8)	3(17.6)	12(70.6)	0(0.0)	0(0.0)			0(0.0)	0(0.0)	11(91.7)	0(0.0)	1(8.3)	
	50%-80% of the time	0(0.0)	3(14.3)	16(76.2)	2(9.5)	0(0.0)			0(0.0)	0(0.0)	0(0.0)	13(100.0)	0(0.0)	0(0.0)
	less than 50% of the time	4(12.9)	4(12.9)	23(74.2)	0(0.0)	0(0.0)			0(0.0)	0(0.0)	0(0.0)	8(80.0)	0(0.0)	2(20.0)
Do you regenerate the idea of wanting to smoke due to the epidemic(if you have quit smoking, then relapse)?	no	7(12.3)	7(12.3)	42(73.7)	1(1.8)	0(0.0)	2.236	0.528	0(0.0)	0(0.0)	75(97.4)	1(1.3)	1(1.3)	
	yes	1(3.4)	3(10.3)	24(82.8)	1(3.4)	0(0.0)			0(0.0)	0(0.0)	4(57.1)	3(42.9)	0(0.0)	
anxiety	no	12(7.7)	21(13.5)	121(78.1)	1(0.6)	0(0.0)	9.625	0.015	0(0.0)	0(0.0)	128(93.4)	3(2.2)	6(4.4)	
	yes	0(0.0)	1(2.9)	31(91.2)	2(5.9)	0(0.0)			0(0.0)	0(0.0)	9(69.2)	2(15.4)	2(15.4)	
depression	no	12(6.9)	20(11.6)	138(79.8)	3(1.7)	0(0.0)	0.852	0.822	0(0.0)	0(0.0)	133(92.4)	5(3.5)	6(4.2)	
	yes	0(0.0)	2(12.5)	14(87.5)	0(0.0)	0(0.0)			0(0.0)	0(0.0)	4(66.7)	0(0.0)	2(33.3)	
calm	no	3(2.6)	6(5.1)	106(90.6)	2(1.7)	0(0.0)	21.428	<0.001	0(0.0)	0(0.0)	96(92.3)	4(3.8)	4(3.8)	
	yes	9(12.5)	16(22.2)	46(63.9)	1(1.4)	0(0.0)			0(0.0)	0(0.0)	41(89.1)	1(2.2)	4(8.7)	
almost as usual	no	0(0.0)	3(5.8)	47(90.4)	2(3.8)	0(0.0)	10.204	0.011	0(0.0)	0(0.0)	72(92.3)	3(3.8)	3(3.8)	
	yes	12(8.8)	19(13.9)	105(76.6)	1(0.7)	0(0.0)			0(0.0)	0(0.0)	65(90.3)	2(2.8)	5(6.9)	
relieving sorrow and boredom	no	119(7.1)	20(12.8)	122(78.2)	3(1.9)	0(0.0)	1.913	0.559	0(0.0)	0(0.0)	136(93.2)	3(2.1)	7(4.8)	
	yes	1(3.0)	2(6.1)	30(90.9)	0(0.0)	0(0.0)			0(0.0)	0(0.0)	1(25.0)	2(50.0)	1(25.0)	
leisure time	no	12(7.7)	16(10.3)	125(80.1)	3(1.9)	0(0.0)	4.047	0.233	0(0.0)	0(0.0)	137(95.1)	3(2.1)	4(2.8)	
	yes	0(0.0)	6(18.2)	27(81.8)	0(0.0)	0(0.0)			0(0.0)	0(0.0)	0(0.0)	2(33.3)	4(66.7)	
other habits such as smoking addiction, etc.	no	12(10.1)	19(16.0)	87(73.1)	1(0.8)	0(0.0)	16.990	<0.001	0(0.0)	0(0.0)	137(92.6)	5(3.4)	6(4.1)	
	yes	0(0.0)	3(4.3)	65(92.9)	2(2.9)	0(0.0)			0(0.0)	0(0.0)	0(0.0)	0(0.0)	2(100.0)	
Assessment of willingness to quit smoking during the epidemic	very low willingness	0(0.0)	1(33.3)	2(66.7)	0(0.0)	0(0.0)	21.956	0.020	0(0.0)	0(0.0)	0(0.0)	0(0.0)	2(100.0)	
	relatively low	0(0.0)	4(50.0)	4(50.0)	0(0.0)	0(0.0)			0(0.0)	0(0.0)	0(0.0)	0(0.0)	2(100.0)	
	general	0(0.0)	1(7.1)	13(92.9)	0(0.0)	0(0.0)			0(0.0)	0(0.0)	0(0.0)	0(0.0)	1(100.0)	
	relatively high	0(0.0)	0(0.0)	24(96.0)	1(4.0)	0(0.0)			0(0.0)	0(0.0)	2(28.6)	3(42.9)	2(28.6)	
	very high	4(5.6)	8(11.1)	60(83.3)	0(0.0)	0(0.0)			0(0.0)	0(0.0)	2(16.7)	3(25.0)	7(58.3)	

Table 6 The impact of home time, psychological and emotional state, and reasons for smoking during the COVID-19 pandemic on relapse thoughts (after matching)

question	grade	did not completely quit smoking before the epidemic				quit smoking before the epidemic			
		no	yes	χ^2	p	no	yes	χ^2	p
depression	no	56(70.9)	23(29.1)	6.858	0.009	74(92.5)	6(7.5)	0.095	0.757
	yes	1(14.3)	6(85.7)			3(75.0)	1(25.0)		
calm	no	23(50.0)	23(50.0)	11.727	0.001	37(88.1)	5(11.9)	1.403	0.236
	yes	34(85.0)	6(15.0)			40(95.2)	2(4.8)		
relieving sorrow and boredom	no	52(76.5)	16(23.5)	15.099	<0.001	75(92.6)	6(7.4)	2.545	0.111
	yes	5(27.8)	13(72.2)			2(66.7)	1(33.3)		
leisure time	no	50(71.4)	20(28.6)	4.464	0.035	75(92.6)	6(7.4)	2.545	0.111
	yes	7(43.8)	9(56.3)			2(66.7)	1(33.3)		
Assessment of willingness to quit smoking during the epidemic	very low willingness	0(0.0)	1(100.0)	8.809	0.034	0(0.0)	0(0.0)	-	-
	relatively low	2(100.0)	0(0.0)			0(0.0)	0(0.0)		
	general	5(62.5)	3(37.5)			0(0.0)	0(0.0)		
	relatively high	11(84.6)	2(15.4)			0(0.0)	0(0.0)		
	very high	13(43.3)	17(56.7)			2(40.0)	3(60.0)		

Table 7 The impact of the intention to quit smoking during the epidemic during the home time during the COVID-19 pandemic (after matching)

question	grade	did not completely quit smoking before the epidemic					r_s	p	quit smoking before the epidemic				
		very low willingness	relatively low	general	relatively high	very high			very low willingness	relatively low	general	relatively high	very high
In the past two weeks, what was the daily time spent at home?	almost all day	0	4	5	15	48	-0.237	0.010	0	0	1	0	4
	80-90% of the time	1	1	0	4	6			0	1	0	0	0
	50%-80% of the time	1	1	3	1	9			0	0	0	0	2
	less than 50% of the time	1	2	4	5	7			1	1	0	0	0

Figures

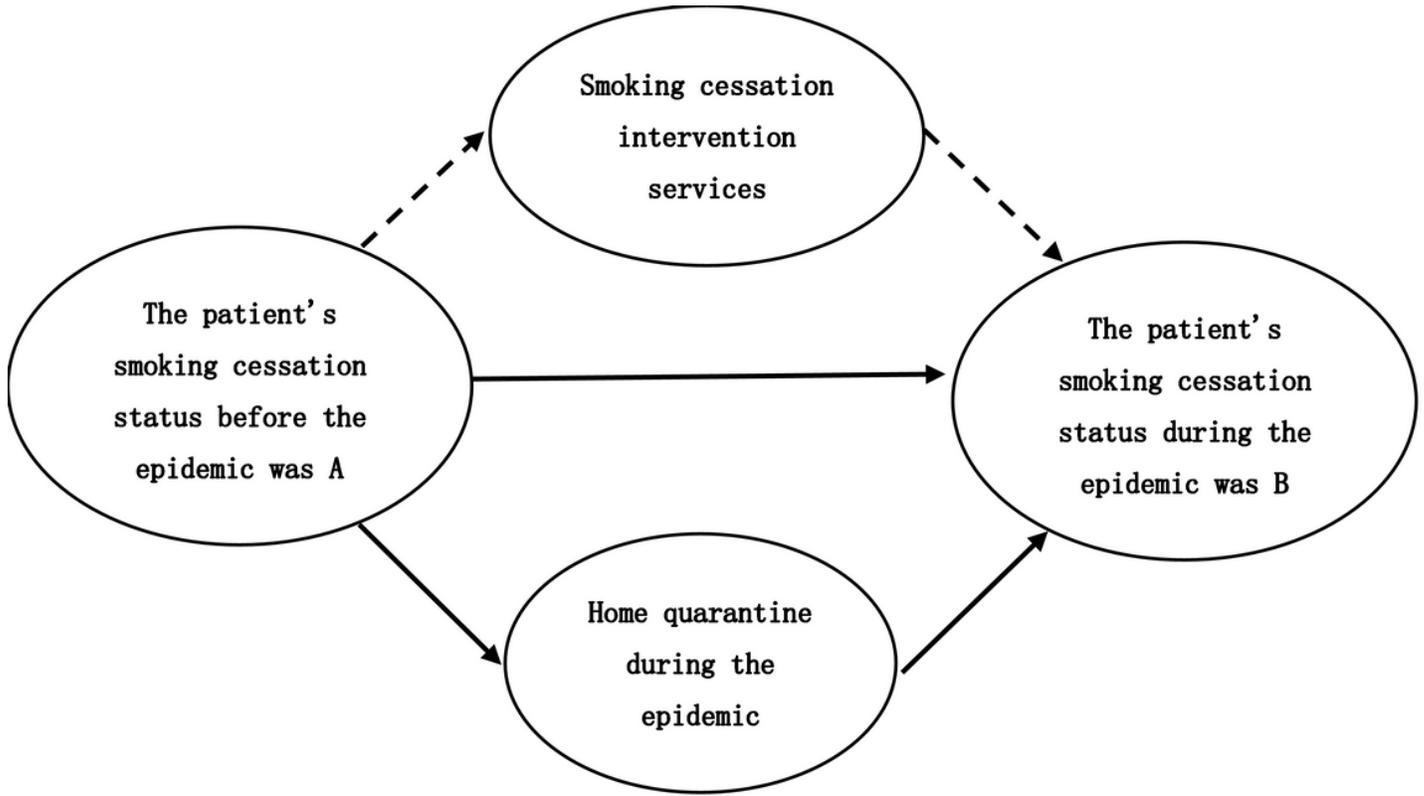


Figure 1
 Flow chart of the analysis of the impact of home isolation of smoking cessation subjects in Beijing communities on their smoking behavior during the COVID-19 pandemic

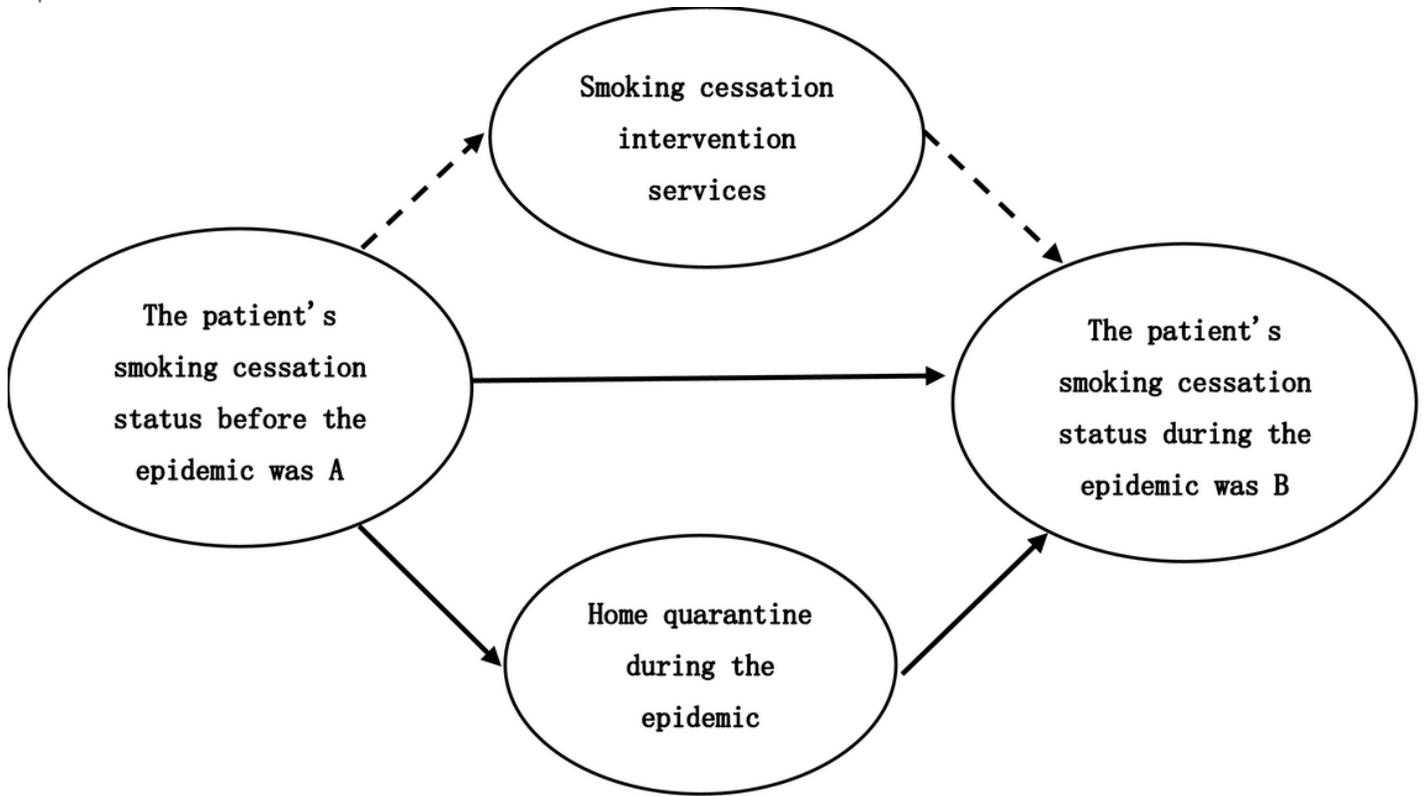


Figure 1
 Flow chart of the analysis of the impact of home isolation of smoking cessation subjects in Beijing communities on their smoking behavior during the COVID-19 pandemic

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