

## **Supplementary appendix**

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## **eMethods**

### 1. Details of video-call screening

Online registered smokers who were determined to be initially eligible were called to schedule an office visit with research staff. Smokers who were unable to attend office visits were asked to provide their mailing addresses. Smoking cessation advisors mailed screening packages (i.e., consent forms, questionnaires, and cotinine supplies) to the participants' homes and scheduled a video-call screening afterward. For video call cotinine test procedures, please refer to the "Details of biochemical validation" section below.

### 2. Details of biochemical validation

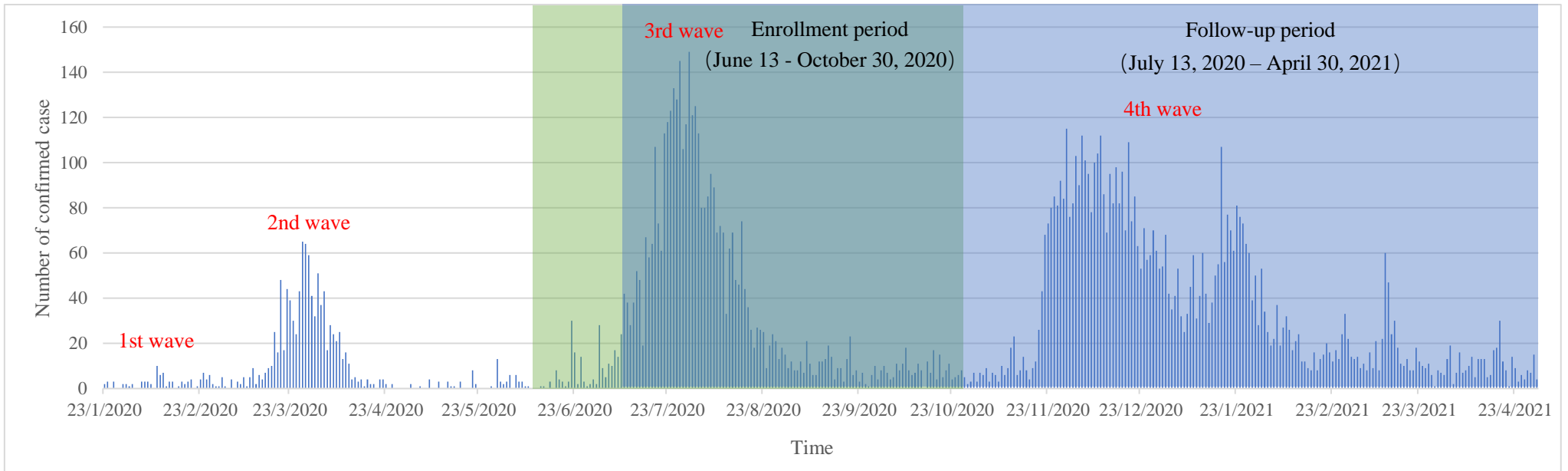
Participants who self-reported abstinence for more than 7 days at 3 and 6 months were invited for biochemical validation by salivary cotinine or expired carbon monoxide (CO). Biochemical tests were performed in person or remotely under the instruction of research staff. For participants who were unable to attend the in-person test, research staff mailed cotinine supplies to their home addresses and scheduled video-call validation tests when the supplies were received.

Saliva cotinine levels were measured using the Alere iScreen® Oral Fluid Device (OFD) Test (New Line Medical).<sup>1</sup> Participants were instructed to insert the cotton swab into their mouth and actively move it inside the mouth and tongue for at least 3 min. After the cotton swab was completely saturated with saliva, the cotton swab was inserted vertically into the cap and then placed horizontally for the 10-min processing time until a result indicating the participant's smoking status appeared on the result window. A negative iScreen® result (i.e., cotinine concentrations <30 ng/ml) was classified as biochemically verified abstinence. For participants who reported using nicotine replacement therapy (NRT), abstinence was biochemically verified by providing a breath carbon monoxide (CO) sample <4 ppm. Exhaled CO was assessed by a Smokerlyzer® (Bedfont Scientific Ltd). Participants were instructed to take a deep breath, hold it for 15 seconds, and exhale slowly into the mouthpiece of the Smokerlyzer®.

As an award of the "Quit to Win" contest, all participants who passed the biochemical validation were given a small cash prize of HK\$500 (≈US\$64). Our previous "Quit to Win" contest found that such a small, abstinence-contingent cash incentive had no effect on smoking cessation outcomes.<sup>2</sup>

## Supplementary results

Figure S1 Number of confirmed COVID-19 cases in Hong Kong (Jan 23, 2020-April 30, 2021)



Data were adapted from the center for Health Protection.<sup>3</sup>

Figure S2 Generic health warning leaflet in the control group

## 吸煙引致的疾病「因果關係」

**癌症**

**慢性疾病**

中風  
失明、白內障、老年性黃斑病變  
先天性缺陷 - 母親吸煙: 兔唇

口咽癌  
喉癌  
食道癌

主動脈瘤、  
年青成人早期腹部主動脈硬化

冠心病  
肺炎

氣管、支氣管及肺癌  
外周血管硬化病

急性骨髓性白血病  
慢性阻塞性肺病、肺結核、  
哮喘及其它呼吸器影響

胃癌  
糖尿病

肝癌  
影響女性生殖能力  
(包括降低生育能力)

胰臟癌  
腎臟癌  
及尿道癌

子宮頸癌  
髖骨折

膀胱癌  
影響男性生殖能力: 陽痿

結腸直腸癌  
類風濕性關節炎

影響免疫系統  
削弱全身機能

資料來源: USDHHS 2004, 2006, 2012.  
\*紅色表示2014年新增加的疾病

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**戒煙可**預防**多種致命疾病**

每年因**吸煙死亡**人數  
全球: 超過 **700萬** 人  
香港: 超過 **6000** 人

**戒煙可**保障**家人**  
免受二手、三手煙影響

每年因**三手煙**的致命人數  
全球: 超過 **89萬** 人  
香港: 約 **700** 人

**世界衛生組織警告**

每**2**個吸煙者 → 就有**1**個死於吸煙

**最新研究指出** 年輕吸煙、煙量大、煙齡長

每**3**個吸煙者 → 就有**2**個死於吸煙

**吸煙者平均壽命比非吸煙者短十年**

綜合戒煙熱線  
**1833 183**

**立即戒煙**  
活出你的健康快樂人生

HKU Med LKS Faculty of Medicine School of Nursing 香港大學護理學院  
HKU Med LKS Faculty of Medicine School of Public Health 香港大學公共衛生學院  
CASH 中國香港戒煙協會

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# 警告

**老化** 皮膚  
**中風**  
**冠心病** 缺血壞死部份  
**口腔癌**  
**陽痿**

**發黃 口臭 牙周病**

## 吸煙及二手煙可導致

**末梢血管病**

不吸煙者的肺部 vs 吸煙者的肺部

**肺癌**

危害家人健康

**二手煙可導致:**  
肺癌、中風、鼻敏感、兒童呼吸系統疾病及肺功能受損、嬰兒出生體重不足、嬰兒猝死綜合症、哮喘、中耳炎、呼吸道刺激症狀。

The content of the general health warning leaflet included the following: (1) the absolute risk of death due to smoking; (2) the whole list of diseases caused by active and second-hand smoking; (3) ten horrible pictorial warnings of health consequences of smoking and secondhand smoke; (4) the benefits of smoking cessation; and (5) simple messages to encourage participants to quit smoking and remind them to call the smoking cessation hotline 1833183.



Figure S3 COVID-19 warning leaflet in the intervention group

## 吸煙引致的疾病「因果關係」

**急性疾病**

- 肺癌
- 口咽癌
- 喉癌
- 食道癌
- 氣管、支氣管及肺癌
- 急性骨髓性白血病
- 胃癌
- 肝癌
- 胰臟癌
- 腎臟癌及尿道癌
- 子宮頸癌
- 膀胱癌
- 結腸直腸癌

**慢性疾病**

- 中風
- 失明、白內障、老年性黃斑病變
- 先天性缺陷 - 母親吸煙: 兔唇
- 牙周炎
- 主動脈瘤、年青成人早期腹部主動脈硬化
- 冠心病
- 肺炎
- 外周血管硬化病
- 慢性阻塞性肺病、肺結核、哮喘及其它呼吸道影響
- 糖尿病
- 影響女性生殖能力 (包括降低生育能力)
- 關節炎
- 宫外孕
- 影響男性生殖能力: 陽痿
- 類風濕性關節炎
- 影響免疫系統
- 削弱全身機能

資料來源: USDHHS 2004, 2006, 2012.  
\*紅色表示2014年新增加的疾病

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**綜合戒煙熱線**  
**1833 183**

**立即戒煙**  
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吸煙者平均壽命比非吸煙者短十年

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### 吸煙易中招?

- 口罩開洞方便吞雲吐霧，等於直接摧毀它的防護功能。
- 口罩拉到下巴，手部和衣袖難免觸碰到口罩外層，如再碰眼口鼻，增加感染風險。
- 吸煙人士日常會一班人圍著吸煙(打邊爐)，未有保持社交距離，病毒極易透過飛沫傳播。
- 吸入二手煙，會增加患上呼吸道感染和肺癌的風險。

### 立即戒煙 預防新冠肺炎

- 吸煙人士通常較容易患上呼吸道感染，如肺炎及胸腔炎。
- 吸煙損害免疫系統，令身體更難對抗病毒，更易受感染。
- 肺功能較差的人，一旦患上新冠肺炎，更容易衍生出併發症。
- 由戒煙一刻開始，心臟及肺部功能得到改善
- 增強呼吸道免疫力，更有效對抗病毒
- 保護你身邊的人，尤其是小朋友，免受二/三手煙的危害

The content of the COVID-19 warning leaflet included the following: (1) the absolute risk of death due to smoking; (2) the whole list of diseases caused by active and second-hand smoking; (3) the risks of COVID-19 due to smoking (susceptibility, severity, hospitalization, and mortality); (4) the benefits of smoking cessation during the COVID-19 pandemic; and (5) simple messages to encourage participants to quit smoking and remind them to call the smoking cessation hotline 1833183.

**Figure S4 Examples of text and image messages in the intervention group**

Message types	Message contents
Severity of COVID-19 outcomes	<p>(a) 最新研究顯示，新冠肺炎病例中，吸煙者感染且病情惡化的機率比非吸煙者高。不妨趁防疫期間戒咗佢 😊，輕鬆又健康 🌿🌿🌿！ [Recent studies have shown that among COVID-19 patients, smokers are more likely than nonsmokers to be infected and to have more severe treatment outcomes. Quit smoking during the COVID-19 pandemic, be healthy and be relaxed.]</p> <p>(b) 吸煙損害肺部和削弱免疫力。一旦感染新冠肺炎，年齡大嘅人，患有心臟病，呼吸系統疾病或有吸煙習慣嘅人，有更大機會患上重症 🏥 [Smoking damages the lungs and weakens the immune system. Once infected with COVID-19, those who are older, have heart disease or respiratory disease, or who are smokers have a higher chance of severe COVID-19 infection.]</p> <p>(c) 吸煙者感染新冠病毒重症概率是不吸煙者的 1.91 倍 🏥 為保護自己同身邊嘅人，即刻戒煙啦！ [Smokers are 1.91 times more likely to have severe COVID-19 symptoms than nonsmokers. Quit smoking now to protect yourself and the people around you.]</p>
Susceptibility to COVID-19 infection	<p>Image messages adopted from tweets and Facebook posts from (a) WHO, (b) Centre for Health Protection of the Hong Kong Government, and (c) Li Ka Shing Faculty of Medicine of the University of Hong Kong</p> <div style="display: flex; justify-content: space-around;"> <div data-bbox="488 738 992 1230"> <p>将您的手放到嘴里会把病毒传到您的体内。</p> <p><b>吸烟会增加您罹患COVID-19的机会</b></p> <p>共享水烟等烟草制品可在人与人之间传播病毒</p> <p>#2019冠状病毒病#</p> </div> <div data-bbox="1032 738 1523 1230"> <p><b>預防肺炎 立即戒煙</b></p> <p>吸煙難免觸摸口罩和口鼻，增加感染冠狀病毒(COVID-19)風險。</p> <p>綜合戒煙熱線 1833183 戒煙流動應用程式 Integrated Smoking Cessation Helpline Quit Smoking Mobile App</p> <p>www.tcco.gov.hk</p> </div> <div data-bbox="1547 738 2067 1230"> <p><b>吸煙易中招？</b></p> <p>口罩開洞 直接摧毀防護功能</p> <p>煙民「圍爐」聊天 人與人之間距離接近，容易飛沫傳播</p> <p>煙民「圍爐」聊天 人與人之間距離接近，容易飛沫傳播</p> <p>新冠肺炎病例中，吸煙者病情惡化機率較非吸煙者高 <b>不妨趁防疫期間戒煙，保持身體健康！</b></p> <p>HKU Med</p> </div> </div>

**Table S1. Sensitivity analyses on primary and secondary outcomes**

	Complete case		Multiple imputation	
	RR (95% CI)	<i>P</i> value	RR (95% CI)	<i>P</i> value
<b>Primary outcomes</b>				
Biochemically verified 7-day PPA				
3-month	0.85 (0.61-1.17)	0.32	0.86 (0.62-1.21)	0.40
6-month	0.81 (0.58-1.12)	0.21	0.82 (0.58-1.17)	0.27
<b>Secondary outcomes</b>				
Self-reported 7-day PPA				
1-month	0.66 (0.47-0.92)	0.02	0.67 (0.48-0.95)	0.02
2-month	0.74 (0.56-0.99)	0.046	0.76 (0.56-1.02)	0.07
3-month	0.71 (0.56-0.90)	0.005	0.73 (0.56-0.95)	0.02
6-month	0.82 (0.64-1.04)	0.10	0.85 (0.66-1.10)	0.23
Smoking reduction <sup>a</sup>				
1-month	0.98 (0.80-1.20)	0.83	1.00 (0.79-1.25)	0.97
2-month	1.00 (0.81-1.23)	0.99	0.99 (0.79-1.24)	0.94
3-month	1.16 (0.93-1.45)	0.20	1.20 (0.93-1.55)	0.16
6-month	1.19 (0.95-1.49)	0.14	1.18 (0.93-1.50)	0.18

RR: risk ratio; CI: confidence interval; PPA: point prevalence of abstinence.

<sup>a</sup> Quitting not included as reduction.

**Table S2. Baseline predictors of 6 month biochemically verified PPA (N=1166)**

Characteristics	Adjusted RR (95% CI) <sup>a</sup>	Adjusted RR (95% CI) <sup>b</sup>
Sex		
Male	Ref	Ref
Female	0.79 (0.50-1.27)	0.69 (0.42-1.12)
Age group, years		
≤29	Ref	Ref
30-59	1.25 (0.86-1.83)	1.15 (0.78-1.71)
≥60	1.04 (0.59-1.84)	0.84 (0.46-1.53)
Daily cigarette consumption, stick		
1-10	Ref	Ref
>11	0.55 (0.37-0.81)**	0.55 (0.37-0.82)**
Past quit attempt(s)		
No	Ref	Ref
Yes	1.54 (0.99-2.39)	1.21 (0.78-1.90)
Readiness to quit, days		
>30	Ref	Ref
≤30	2.88 (1.92-4.34)***	2.44 (1.61-3.71)***
Recruitment methods		
Onsite	Ref	
Online	2.40 (1.68-3.44)***	1.96 (1.35-2.83)***
Perceived susceptibility of COVID-19 due to smoking	1.01 (0.95-1.07)	1.01 (0.95-1.07)
Perceived severity of COVID-19 due to smoking	1.08 (1.02-1.14)*	1.07 (1.00-1.13)*

PPA: point prevalence of abstinence, RR: risk ratio

<sup>a</sup> Adjusted for group.

<sup>b</sup> Adjusted for group and mutually adjusted.

\* P<0.05, \*\* P<0.01, \*\*\* P<0.001



**Table S3. Biochemically validated 7-day PPA at 6 months by intervention engagement**

	Validated	Poisson regression	
	abstinence n (%)	Crude RR (95% CI)	Adjusted RR <sup>b</sup> (95% CI)
Intervention group			
Not engaged <sup>a</sup> (n=94)	0 (0.0)	-	-
Read some messages only (n=71)	0 (0.0)	-	-
Read some messages & had conversations (n=71)	3 (4.2)	Ref	Ref
Read all messages only (n=130)	4 (3.1)	0.73 (0.17-3.17)	0.63 (0.15-2.68)
Read all messages & had conversations (n=217)	47 (21.7)	5.13 (1.64-16.00)**	4.21 (1.33-13.30)*
Control group			
Not engaged <sup>a</sup> (n=113)	2 (1.8)	Ref	Ref
Read partial messages (n=116)	66 (14.0)	1.95 (0.36-10.40)	2.05 (0.39-10.70)
Read all messages (n=354)	68 (11.7)	9.90 (2.46-39.90)**	9.65 (2.48-37.50)**

\*  $P < 0.05$ ; \*\*  $P < 0.01$ ; \*\*\*  $P < 0.001$ .

Abbreviation: PPA: point prevalence of abstinence, RR: risk ratio; CI: confidence interval.

<sup>a</sup> Participants with missing data were counted as non-engagement in the analysis.

<sup>b</sup> Adjusted for sex, age, past quit attempts, and readiness to quit at baseline.

References:

1. Moore MR, Mason MJ, Brown AR, Garcia CM, Seibers AD, Stephens CJ. Remote biochemical verification of tobacco use: Reducing costs and improving methodological rigor with mailed oral cotinine swabs. *Addict Behav.* 2018;87:151-154.
2. Cheung YTD, Wang MP, Li HCW, et al. Effectiveness of a small cash incentive on abstinence and use of cessation aids for adult smokers: a randomized controlled trial. *Addictive Behaviors.* 2017;66:17-25.
3. Hong Kong Centre for Health Protection. Archives of Latest situation of cases of COVID-19. 2022; <https://www.chp.gov.hk/en/features/102997.html>. Accessed May 30, 2022.

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