



Brief Report

Changes in Tobacco Use During the 2020 COVID-19 Lockdown in New Zealand

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Abstract

Introduction: New Zealand's response to the COVID-19 pandemic was one of the most restrictive lockdowns of any country, inevitably causing stress for many people. Because situations that increase stress and anxiety are associated with higher smoking prevalence, we examined self-reported smoking before and during the lockdown, and analyzed factors associated with reported changes in cigarette consumption.

Aims and Methods: We conducted an online panel survey of a demographically representative sample of 2010 adult New Zealanders during the COVID-19 lockdown; the final, weighted sample included 261 daily smokers and 71 weekly smokers. We measured psychological distress and anxiety, as well as situational factors, tobacco consumption, and demographic attributes.

Results: Nearly half of daily smokers reported smoking more during than before the lockdown, on average, an increase of six cigarettes a day; increased daily cigarette consumption was associated with loneliness and isolation. Most weekly smokers reported either that their smoking during the lockdown had not changed or had slightly reduced.

Conclusions: Smoking cessation services need to anticipate that unexpected disruptions, such as pandemic lockdowns, may be associated with increased daily tobacco consumption, and that this increase may be sustained after lockdown. While public health responses to pandemics predictably focus on immediate and obvious consequences, interventions to support recent quitters and those making quit attempts should also form a key component of pandemic planning.

Implications: As governments introduce unprecedented measures to manage COVID-19, they need also to consider other public health risks, such as increased smoking among current smokers or relapse among recent quitters. Evidence that loneliness was associated with increased smoking during a lockdown suggests a need for cessation out-reach strategies that promote and support smoke-free practices.

Introduction

Many smokers believe smoking helps them reduce or control stress, and smoking prevalence is much higher among people experiencing anxiety, depression, or other mental illnesses¹; use of smoking to manage stress remains a key barrier to cessation.² Qualitative studies extend this knowledge by explaining how beliefs that smoking provides comfort in times of stress and anxiety may cue relapse by

offering moments of retreat in situations that could otherwise feel chaotic.^{3–5}

Studies of smoking frequency following disruptive events, such as disasters, generally report that tobacco consumption increases among current smokers, while people who had successfully quit smoking become at greater risk of relapse.^{6–8} However, studies examining associations between psychological well-being

following disasters and smoking behaviors have typically focused on physical events (hurricanes, earthquakes, and bushfires),^{6,7,9,10} or terrorism,¹¹ rather than sustained threats to health, such as pandemics.

Although emotional reactions to physical disasters and terrorism may be similar to those aroused by a pandemic, differences suggest event-specific analyses are important. For example, responses following physical disasters and terrorism may provide food, shelter, and emotional support, but because pandemics may necessitate physical distancing, support involving close person contact may no longer be possible.

New Zealand's response to the COVID-19 pandemic involved a restrictive nationwide lockdown that caused significant disruption to people's lives, including greatly reduced physical and social contact with others. We undertook a cross-sectional survey to assess well-being during the COVID-19 lockdown and examined self-reported tobacco use before and during the lockdown (see Every-Palmer et al. for details).¹² Specifically, we addressed the following research questions:

- How did self-reported tobacco use differ during lockdown for daily and occasional smokers?
- What attributes (eg, demographics, mental well-being, cultural affinity) were associated with increases and decreases in self-reported tobacco use during the COVID-19 lockdown?

Methods

Sample

We recruited a large, demographically representative sample of adult New Zealanders aged between 18 and 90 years from Dynata, a company that manages a New Zealand online panel of around 300 000 active members. Recruitment aimed to produce a sample that represented the age–sex distribution of the New Zealand population over 18 years, with sufficient Māori and Pacific respondents to produce reliable estimates by ethnicity, and with target participation quotas by age, sex, and ethnicity.

Procedure and Survey Instrument

We fielded the survey using the Qualtrics platform between April 15, 2020 and April 18, 2020, which corresponded with Alert Level 4 lockdown days 19–22. New Zealand's Alert system comprises four levels; Level 4 required people to stay at home, except for essential personal movement. All gatherings were canceled, public venues and educational centers were closed, and only essential business were open.

The survey took approximately 15 minutes to complete and the final achieved sample comprised 2010 cases. Respondents who reported smoking every day (daily smokers), or at least once a week but not daily (weekly smokers), were asked: "Before the lockdown, about how many cigarettes did you smoke each day/each week?" and "During the lockdown, about how many cigarettes did you smoke each day/each week?" The questionnaire also collected information on respondents' demographic characteristics, living circumstances, and mental well-being during the lockdown, and whether they had lost their job or had their hours of work reduced.

Analysis

Survey responses were weighted using a post-stratification weighting scheme to reflect the 2018 NZ Census adult (age 15+) population

profile by age group, sex, and ethnicity (coded to Māori, Pacific, Asian, and European/Other). These post-stratification weights were checked for extreme weights that would indicate undue influence on estimates from only a small number of participants in a particular age/sex/ethnicity combination (all scaled weights <4). Our processing sample included people who identified as daily or weekly smokers during lockdown (ie, we included people who may have initiated smoking during lockdown).

We considered that changes in smoking during lockdown would be explained by three sets of variables: demographics, psychological distress, and mental health status, and situational variables including previous level of tobacco consumption, living circumstances, loneliness or isolation, loss of a job, or reduction in working hours.¹² We used increased smoking versus no change or decreased smoking during lockdown as the dependent variable in multinomial logistic regression analysis with the following factors: gender, education, ethnicity, the Kessler Psychological Distress Scale (K10) (a validated 10-item scale measuring nonspecific symptoms of anxiety and depression over the previous four weeks),¹³ previous diagnosis of a mental illness, loneliness or social isolation (four-point scale from none of the time to almost all of the time), living alone or with others, and job loss or reduction in working hours. We treated age and number of cigarettes smoked before lockdown as covariates. Reported odds ratios (ORs) (and 95% confidence intervals [CIs]) are thus mutually adjusted for all other covariates. Analysis was conducted using the Complex Samples procedures in SPSS version 25.

Ethics

The University of Otago Human Ethics Committee reviewed and approved the study (F20/003), and we undertook formal consultation with the Ngāi Tahu Research Consultative Committee, which represents the interests of indigenous Māori peoples.

Results

In total, 261 respondents reported smoking every day and a further 71 reported smoking at least once a week but not daily. [Table 1](#) presents the demographic characteristics of these people, compared with those of "regular" smokers reported for the 2018 New Zealand census (Statistics NZ defines a "regular" smoker as someone who currently smokes one or more manufactured or hand rolled tobacco cigarettes a day).

Compared with the census profile of "regular" smokers, smokers in the weighted sample were generally more highly educated, with slightly higher incomes, but otherwise the daily smoker sample was similar to the national profile of regular smokers. Weekly smokers tended to be younger than either daily smokers or regular smokers in general, consistent with the profile of young adult "social smokers."

Changes in Smoking During Lockdown

Before the lockdown, daily smokers smoked an average of 11.1 cigarettes a day, which rose to 13.0 cigarettes a day during lockdown (mean difference = 1.9 cigarettes, $p = .019$). The equivalent results for weekly smokers were 9.1 cigarettes before lockdown, compared with 9.5 cigarettes during lockdown, 9.5 during, a nonsignificant difference of less than half a cigarette a week ($p = .852$).

Overall, 45% of daily smokers smoked more during lockdown; just under 40% did not change their smoking behavior

Table 1. Weighted Sample Characteristics

Characteristic	Daily smokers (<i>n</i> = 261)		Weekly smokers (<i>n</i> = 71)		Regular smokers ^a (NZ Census data)
	Number	%	Number	%	%
Gender					
Male	133	50.9	41	57.3	54.4
Female	128	49.1	30	42.7	45.6
Age group					
18–24 ^b	34	12.9	20	28.5	14.2
25–34	67	25.9	26	36.4	23.7
35–44	45	17.2	9	12.2	18.7
45–54	43	16.6	5	6.7	19.9
55–64	47	17.9	9	13.2	14.7
65+	25	9.5	2	3.0	8.9
Ethnicity ^c					
NZE/Other	131	50.2	34	48.9	51.7
Māori	83	31.6	19	26.8	29.9
Pacific	22	8.5	4	5.0	10.8
Asian	25	8.7	14	19.2	7.7
Education ^d					
No qualification, school level only	139	53.4	31	43.6	71.7
Post school qualification	65	24.9	13	18.8	18.7
University level qualification	57	21.8	27	37.5	9.5
Personal income ^e					
\$20 000 or less	74	32.2	22	31.4	36.4
\$20 001–\$30 000	31	13.5	6	8.6	15.1
\$30 001–\$50 000	56	24.3	14	20.0	24.4
\$50 001–\$70 000	41	17.8	15	21.4	14.5
\$70 001 or more	28	12.2	13	18.6	9.6

^aSource: StatsNZ, Census 2018, Regular Smokers 15 years and older.

^bCensus Regular Smokers lowest age group is 15–24 years.

^cRespondents could choose more than one ethnicity, but the variable was recoded into a single variable, giving priority to Māori, then Pacific People, then Asian.

^dLow education = No formal qualification or school qualifications only (NZQA Levels 1–3). Medium education = Certificate or diploma below bachelor's level (NZQA Levels 4–6). High education = University degree (NZQA Level 7 and above).

^e“Prefer not to answer” *n* = 31 for daily smokers, *n* = 1 for weekly smokers.

during lockdown (39%), while 16% reported smoking fewer cigarettes per day. By contrast, 34% of weekly smokers smoked more during lockdown, 27% reported smoking the same number of cigarettes before and during lockdown, and 39% smoked fewer cigarettes during lockdown.

The overall estimates of changes in cigarettes smoked before and during lockdown disguise significant differences between those who increased their consumption and those who decreased it. Daily smokers who *decreased* their consumption (*n* = 43) did so on average by 5.0 cigarettes (from 11.2 per day to 6.2, *p* = .001), while those who *increased* their consumption (*n* = 117) did so on average by 6.2 cigarettes (from 10.1 per day to 16.3, *p* < .001). Weekly smokers who *decreased* their consumption (*n* = 28) did so on average by 6.5 cigarettes (from 13.8 per week to 7.3, *p* = .039), while those who *increased* their consumption (*n* = 24) did so on average by 8.6 cigarettes (6.4 per week to 15.0, *p* = .020).

Determinants of Increased or Decreased Smoking During Lockdown

Because fewer than 30 weekly smokers in our sample reported increased (or decreased) smoking during lockdown, we confined our subsequent analysis to daily smokers. Table 2 presents results for smokers who either increased or decreased smoking during

lockdown, compared with those whose smoking behavior did not change.

Smokers who identified as Asian were significantly less likely than smokers of other ethnicities to increase their smoking during lockdown (Adj OR = 0.16 compared with NZ European, 95% CI 0.04–0.60). For other factors, CIs were wide and hence results were inconclusive. Nevertheless, daily smokers identifying as Pacific were most likely to smoke more during lockdown, Māori were likely to smoke less. Women were more likely than men to increase their smoking during lockdown but the CI for the OR is wide (Adj OR 1.38, 95% CI 0.75–2.51).

Daily smokers who were distressed during lockdown (measured by K10), were more likely to have increased smoking compared with those who experienced no or low distress (though, again, the estimates were imprecise). This relationship was strongest for those who experienced high distress (Adj OR = 2.63, 95% CI 1.00–6.93), but weaker for other groups (Moderate Adj OR = 1.75, 95% CI 0.81–3.75; Very High Adj OR 1.28, 95% CI 0.48–3.44).

Daily smokers who reported feeling lonely or isolated almost all of the time during lockdown were more than three times more likely to report increased smoking during lockdown than those who never felt lonely or isolated (Adj OR 3.65, 95% CI 1.35–9.86). Those who were lonely some of the time were twice as likely to smoke more during lockdown than those who were never lonely (Adj OR 2.19, 95% CI 1.07–4.51). Smokers who lived alone were only slightly

Table 2. Multinomial Logistic Regression of Determinants of Increase or Decrease in Smoking Behavior

Predictor (<i>n</i> = 261 daily smokers)	Increased daily smoking ^a (<i>n</i> = 117)		Decreased daily smoking ^a (<i>n</i> = 43)	
	OR and 95% CI ^b	Stratum size	OR and 95% CI ^b	Stratum size
Age	0.99 0.97–1.02	117	0.98 0.95–1.01	43
Gender				
Male	1.00	49	1.00	20
Female	1.38 0.75–2.51	68	1.33 0.61–2.90	23
Ethnicity				
NZE/Other	1.00	51	1.00	18
Māori	0.66 0.36–1.22	53	0.48 0.19–1.19	14
Pacific	1.63 0.45–5.60	9	1.44 0.29–7.21	5
Asian	0.16 0.04–0.60	4	0.97 0.26–3.62	6
Education				
Low	1.00	66	1.00	21
Medium	0.59 0.29–1.24	25	1.12 0.44–2.82	13
High	1.17 0.52–2.59	26	1.14 0.42–3.12	9
Cigarettes before lockdown	0.97 0.93–1.00	117	1.00 0.96–1.04	43
K10 distress and anxiety				
None or low	1.00	23	1.00	20
Moderate	1.75 0.81–3.75	37	0.86 0.29–2.52	8
High	2.63 1.00–6.93	32	0.91 0.23–3.62	7
Very high	1.28 0.48–3.44	25	0.97 0.26–3.62	8
Prior mental diagnosis				
No	1.00	84	1.00	33
Yes	0.84 0.44–1.62	33	0.69 0.28–1.69	10
Lost job or reduced work				
No	1.00	105	1.00	35
Yes	0.98 0.44–2.29	12	1.52 0.49–4.76	8
Felt lonely or isolated				
None of the time	1.00	26	1.00	18
Some of the time	2.19 1.07–4.51	61	0.95 0.40–2.27	20
Almost all of the time	3.65 1.35–9.86	30	0.85 0.22–3.34	5
Live alone				
No	1.00	102	1.00	37
Yes	1.23 0.53–2.84	15	1.42 0.47–4.23	6

^aDependent variable: increased smoking during lockdown vs. no change vs. decreased smoking during lockdown. Reference category: no change (*n* = 101).

^b95% CI = 95% confidence interval; OR = odds ratio.

more likely to smoke more during lockdown than those who lived with others (Adj OR 1.23, 95% CI 0.53–2.84).

Among those who smoked less during lockdown, the main determinant may have been economic; people who had lost their job or had fewer hours of work were 50% more likely to have reduced their daily smoking (Adj OR 1.52, 95% CI 0.49–4.76). They were more likely to be Pacific, female, and to live alone, and less likely to be Māori; however, the CIs for the adjusted ORs were wide.

Discussion

During New Zealand's restrictive COVID-19 lockdown, more than 40% of daily smokers reported smoking more than they did prior to the lockdown, an average increase of six cigarettes a day. Increased cigarette consumption was associated with greater psychological distress and anxiety, particularly loneliness and isolation. These findings reinforce earlier studies that reported use of smoking to manage stress and anxiety.¹⁻³ Evidence from post-lockdown surveys, as well as

research conducted following the Christchurch earthquake in 2011, suggest these increases in tobacco consumption are sustained.^{7,14} While only longitudinal studies can assess whether these increases continue, plateau, or eventually decline, evidence of increased tobacco use among a substantial proportion of daily smokers suggests an urgent need for interventions that could ameliorate or avoid this outcome.

Only a third of weekly smokers increased their smoking more during lockdown, while a larger proportion smoked less, though the small sample of weekly smokers precluded examination of variables associated with these behaviors. However, intermittent smoking commonly occurs in social settings, which would not have been possible during lockdown. Reduced social interactions may explain why most weekly smokers reported either that the lockdown had no effect on their smoking or that they smoked less.

During lockdown, women reported higher levels of psychological distress on the K10 Kessler Psychological Distress Scale than men (OR = 1.27, CI 1.09–1.57, $p = .026$).¹² Greater distress may explain why women were more likely than men to smoke more during lockdown; it is more difficult to explain why women were also more likely to smoke less, though decreased smoking was associated with job loss, which affected women more than men.¹⁵

Our findings are consistent with a recent study of Dutch smokers, which also found reports of both increased and decreased smoking related to COVID-19 stress. Bommele et al. posited that pandemic-related stress may explain this bidirectional response.¹⁶ We did not find their reported dose–response effect with stress, though NZ's severe lockdown was accompanied by wide-ranging economic support, and so may have triggered loneliness rather than financial stress.

Like all studies, ours has some limitations. Our sample members had higher incomes than the overall population (a common characteristic of panel survey samples), suggesting more secure jobs, which may explain why losing a job or reduced work hours were not associated with decreased smoking among daily smokers. Our small sample of weekly smokers precluded detailed analyses; the sample size for daily smokers meant that some regression estimates were imprecise (though the main implications appear clear) and we could not undertake sensitivity analyses.

Unexpected and disruptive events that increase stress and anxiety are well-established causes of increased tobacco use among current smokers.^{6,8,11} We found loneliness and isolation also had significant associations with increased smoking; this finding was not due to living alone, which suggests living alone is not necessarily the same as being lonely. Evidence that increased smoking may continue post-lockdown suggests smoking cessation services need to anticipate the strong negative impacts likely to affect many smokers. Responses could include allocating more resources to Quit lines so they may initiate out-reach to people registered with them, and offering tailored support to people trying to quit or at increased risk of relapse. More generally, providing community support that addresses well-being as well as smoking,¹⁷ reaches the many smokers not engaged with mainstream cessation services,¹⁸ and capitalizes on increased interest in quitting,¹⁹ could integrate smoke-free support into pandemic planning.

Supplementary Material

A Contributorship Form detailing each author's specific involvement with this content, as well as any supplementary data, are available online at <https://academic.oup.com/ntr>.

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Declaration of Interests

None declared.

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