Phalanx Labs

Method paper

Research paper · Version 1.0

How to Quit Smoking and Vaping

Why nicotine is so hard to give up, what withdrawal and relapse actually look like, what the trials show works, and what a staged 90-day method targets, day by day

Phalanx Labs

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Where each section sits in the 90 days

Days 1 to 30	Days 31 to 60	Days 61 to 90
Brain chemistry restabilization	Impulse control	Identity rewiring

1 How do you quit smoking or vaping? The short answer — Background

2 Is it safe to quit nicotine cold turkey? — Background

3 Why is nicotine so addictive? — Background

4 Does smoking actually relieve stress? — Background

5 What triggers the urge to smoke? — Background

6 How long does nicotine withdrawal last? — Background

7 How long do cravings last, and when is relapse most likely? — Background

8 Is it better to quit all at once or cut down first? — Background

9 Is vaping easier to quit, and how do you quit vaping? — Background

10 Why do people gain weight when they quit, and how much? — Background

11 What works best to quit: medication, support or willpower? — Background

12 What happens to your body when you quit smoking? Background

13 What should I do if I smoke again? Background

14 What does the Phalanx program target for someone quitting smoking or vaping, and when? Days 31 to 90

15 What do our results show, and what can't this paper tell you? Background

16 When should you see a doctor, and what is this program not? Background

Sections	Figures	Tables	References	Reading time
16	15	4	74	90 min

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Abstract

The best way to quit smoking or vaping is to stop completely on a set day, use a stop-smoking medicine or nicotine replacement if you can, get support, and plan ahead for every moment you used to smoke. Willpower alone works least well. Nicotine reaches your brain in seconds, and you give it that reward hundreds of times a day, so the habit gets tied to coffee, meals, breaks, the car, drinks, other smokers and stress. Withdrawal is unpleasant but not dangerous. It is worst in the first week and mostly gone in two to four weeks, though cravings can last for months. The first week and the first three months are when most people go back. If you take prescribed medicine, are pregnant or have had depression, talk to a doctor or pharmacist before you stop.

This paper explains each part of that answer and the research behind it. It covers whether it is safe to stop all at once, why nicotine is so addictive, whether smoking really relieves stress, what triggers the urge, how long withdrawal and cravings last, when relapse is most likely, whether to cut down first, how vaping compares and how to stop it, how much weight people gain, what works best among medicines, support and willpower, what happens to the body after stopping, and what to do after smoking again. Smoking has one of the strongest evidence bases of any habit, and we draw on the Cochrane reviews and the trials behind them throughout. Each section starts with a short, direct answer. The detail and the evidence follow.

The last part of the paper describes what the Behavior Control System, the 90-day method Phalanx Labs runs with every client, targets for someone quitting smoking or vaping and on which days. Of the 290+ clients we have worked with across 12 countries over 7 years, 98.4% had already tried and failed to stop before they came to us. We report a 97% success rate, defined as the share of clients who ran the program and stayed off the habit through the program and the six months of aftercare that follow it, and we explain how it is tracked and what it cannot show. It comes from client follow-up, not from a controlled trial. The program is behavioural support. It is not therapy, clinical care or medical treatment, and it does not replace medication a doctor prescribes.

Keywords

how to quit smoking | how to quit vaping | nicotine withdrawal | nicotine cravings | nicotinic receptors | dopamine | smoking triggers | smoking and stress | cold turkey | relapse | nicotine replacement therapy | varenicline | e-cigarettes | weight gain after quitting | behavioural support | habit

Section 01

How do you quit smoking or vaping? The short answer

In brief

Stop completely on a set day, use a stop-smoking medicine or nicotine replacement if you can, get support, and plan in advance what you

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will do at each moment you used to smoke. Hold on hardest in the first week and the first three months, when most people go back.

Medical safety note

Stopping nicotine is not dangerous the way stopping alcohol can be. Withdrawal is hard, but it is not a medical emergency. Talk to a doctor or pharmacist before you stop if you take a prescribed medicine, because smoking changes how fast the body clears some drugs, including theophylline, some antipsychotic and antidepressant medicines, propranolol, flecainide and insulin, and the dose may need checking once you stop[1]. Coffee clears more slowly too, so the same cup can feel stronger. If you are pregnant, ask your midwife or doctor which aids to stopping are right for you. If you have had depression or another mental health condition, tell your doctor you are stopping, so they can watch how you are in the first weeks, when low mood is common[2]. If a doctor has prescribed a stop-smoking medicine, follow their instructions. This program does not replace it.

The way to quit smoking or vaping that works best is to stop completely on a set day, use a stop-smoking medicine or nicotine replacement if you can, get support from people who know how to give it, and work out in advance what you will do at every moment you used to smoke. Willpower alone is the method that fails most often. Most people who quit without help are smoking again within days, and only 3 to 5 in every 100 are still not smoking six months to a year later[3]. Medicines and support each raise those odds, and together they raise them most[4]. The hardest stretch is the first week, then the first three months.

Nicotine is hard to quit because it trains the brain fast and often. It reaches the brain within seconds of a puff[5], and a smoker on 20 a day gives it that reward hundreds of times a day, each time in a place, a mood or a moment that becomes a trigger. Stopping takes away the nicotine, but it leaves the triggers in place: the first coffee, the end of a meal, the car, the break at work, the drink with friends, the stressful email. So the work of quitting is in two parts. One is getting through the weeks while the brain resets. The other is taking apart the routine the cigarette or vape was built into.

Most smokers want to stop, and most have tried. In a United States survey in 2015, 68.0% of adult smokers said they wanted to quit and 55.4% had tried in the past year, but only 7.4% had recently succeeded, and fewer than a third used any proven help when they tried[6]. Benowitz puts the yearly picture plainly: about 40% of smokers stop for at least a day each year, and only about 3% stop for good[7]. People who quit usually do it after many attempts. In a Canadian study that followed 1,277 smokers who tried to quit, the best estimate was that it took about 30 attempts on average before one lasted[8]. The number of attempts is not a judgement on anyone. It shows that the usual way of trying is weak.

That is the pattern we see too. Of the 290+ clients we have worked with across 12 countries over 7 years, 98.4% had already tried and failed to stop before they came to us, and nicotine is one of the habits people bring us most often, sometimes on its own and often alongside another one. The attempts had been real: a quit date at New Year, a switch to vaping, cutting down to five a day, nicotine gum that ran out, a promise to a partner. What most of those attempts had in common was that they changed the decision and left the routine alone.

This paper sets out what the research says about each part of quitting, from the first seven seconds of a puff to the years of life that stopping gives back. Smoking has the strongest evidence base of any habit people try to break. Cochrane reviews pool hundreds of randomized trials of medicines, nicotine replacement, e-cigarettes and counselling[9-11], and we lean on them throughout. Where the evidence for something is weak, we say so. The last part of the paper describes what the Behavior Control System, the 90-day program Phalanx Labs runs with every client, targets for someone stopping smoking or vaping, and on which days. It works alongside stop-smoking medicines, never in place of them.

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Table 1. The ways people most often try to quit smoking or vaping, what each one changes, and what each one leaves in place. These are the attempts our clients most often describe before they came to us; the evidence for each is in the sections named.

Attempt	What it changes	What it leaves in place
Cold turkey on willpower alone	The decision, on the day	Every trigger, the stress, and the first weeks of withdrawal, met with no medicine and no plan. Most relapse comes within the first 8 days (Section 7).
Cutting down first	How many a day	Each cigarette still refills the receptors and still runs the routine. In a trial, cutting down led to fewer people stopping than stopping on one day (Section 8).
Switching to vaping	How the nicotine is taken	The nicotine, and often the same triggers. It can help people stop smoking, but most who switch keep vaping (Section 9).
Nicotine gum or patches, then stopping them early	Withdrawal, for a while	The triggers and the routine. Medicines work best with a full course and with support (Section 11).
Smoking only when drinking, or only at weekends	When it happens	The link between nicotine and those moments, which stays strong. One cigarette after stopping usually leads back to regular smoking (Section 13).
Starting again on Monday	Motivation	Nothing structural. The conditions that led to the last cigarette are still there for the next one.

Section 02

Is it safe to quit nicotine cold turkey?

In brief

Yes, for almost everyone. Nicotine withdrawal is unpleasant but not dangerous. The real safety points are medicines whose dose changes when you stop smoking, pregnancy, and a history of depression. Stopping all at once also works better than cutting down.

Yes. For almost everyone it is safe to stop smoking or vaping all at once. Nicotine withdrawal makes you irritable, anxious, low, restless, hungry and badly slept for a few weeks, but it does not cause the seizures or delirium that alcohol withdrawal can[2]. Stopping all at once is also the more effective way to stop: in a randomized trial, more people who stopped on one day were still not smoking six months later than people who cut down first[12]. There are three things to check with a doctor or pharmacist first, set out below.

The first is prescribed medicines. Tobacco smoke, not the nicotine in it, speeds up a liver enzyme called CYP1A2, which breaks down a number of drugs. Zevin and Benowitz list the drugs for which this has clinical consequence: theophylline, caffeine, tacrine, imipramine, haloperidol, pentazocine, propranolol, flecainide and estradiol. Smoking also speeds the clearance of heparin, slows how fast injected insulin is absorbed, and weakens the effect of beta-blockers, benzodiazepines and some pain medicines[1]. When someone stops smoking, the enzyme slows back down, and the same dose of one of those drugs can produce higher levels in the blood than before. This is why anyone on a prescribed medicine should tell their doctor or pharmacist the date they are stopping. It is a short conversation, and it matters most for people on medicines with a narrow safe range.

Caffeine is on the same list, which surprises people. Smokers clear caffeine faster than non-smokers, so a smoker who drinks four coffees a day is used to the effect of four coffees cleared quickly[1]. After stopping, the same four coffees stay in the body longer. Some of the jitteriness and poor sleep people put down to withdrawal in the first weeks can come from coffee they have not cut back. It is worth drinking less of it for a while after the stop date.

The second is pregnancy. Stopping smoking is one of the most useful things a pregnant woman can do for herself and her baby, and it is still worth talking to a midwife or doctor first about which aids to stopping are right during pregnancy. The third is a history of depression or another mental health condition. Low mood is one of the main symptoms of nicotine withdrawal, and it is strongest in the first week[2]. People with a history of depression report more changeable withdrawal symptoms[13]. That is not a reason to keep smoking. Over the longer term, people who quit show less anxiety and depression than people who carry on (Section 4)[14]. It is a reason to tell a doctor, so the first weeks are watched.

Stop-smoking medicines are safe for most people, and they are the main thing that people who stop on willpower alone are missing. For years there was a worry that varenicline caused serious psychiatric side effects. The largest trial to test it, EAGLES, randomized 8,144 smokers, about half of whom had a psychiatric diagnosis, to varenicline, bupropion, the nicotine patch or placebo. It found no significant rise in serious neuropsychiatric side effects with varenicline or bupropion compared

with the patch or placebo, and varenicline helped more people stop than any of the others[15]. Medicines are for a doctor or pharmacist to prescribe and adjust. This program does not prescribe them, and anyone taking one keeps to it as directed.

What this means in practice

Pick a stop date. Before it, tell your doctor or pharmacist if you take any prescribed medicine, are pregnant, or have had depression. Ask about a stop-smoking medicine or nicotine replacement. On the day, stop completely. Expect a hard first week, and expect it to ease.

Section 03

Why is nicotine so addictive?

In brief

Nicotine reaches the brain in seconds, releases dopamine, and fills most of a particular kind of receptor with a puff or two. Repeated hundreds of times a day, in the same places and moods, that teaches the brain a habit that runs on its own. The brain also adapts, so going without feels bad.

Nicotine is so addictive because it reaches the brain within seconds, releases dopamine, the chemical the brain uses to learn what is worth repeating, and does it many times a day in the same places and moods. Each puff is a small, fast lesson. A pack-a-day smoker takes a few hundred puffs a day, every day, for years. The brain learns the routine so well that it starts without a decision, and it adapts to the nicotine so that going without it feels bad. People smoke to get the reward at first, and later mostly to stop feeling the lack of it[7].

3.1 Seven seconds to the brain

How fast a drug reaches the brain shapes how strongly it is learned. Inhaled nicotine is absorbed through the large surface of the lungs and carried straight to the brain in arterial blood. Benowitz describes it moving into the brain within seconds of a puff[16]. Rose and colleagues measured it

directly. They gave 13 dependent and 10 non-dependent smokers cigarettes containing a trace of radioactively labelled nicotine and watched it arrive with PET scanning. Nicotine began to reach the brain about 7 seconds after the puff in both groups. In dependent smokers it took 33 seconds to reach half its peak level and about 290 seconds to reach the peak; in non-dependent smokers, 19 and 210 seconds[5].

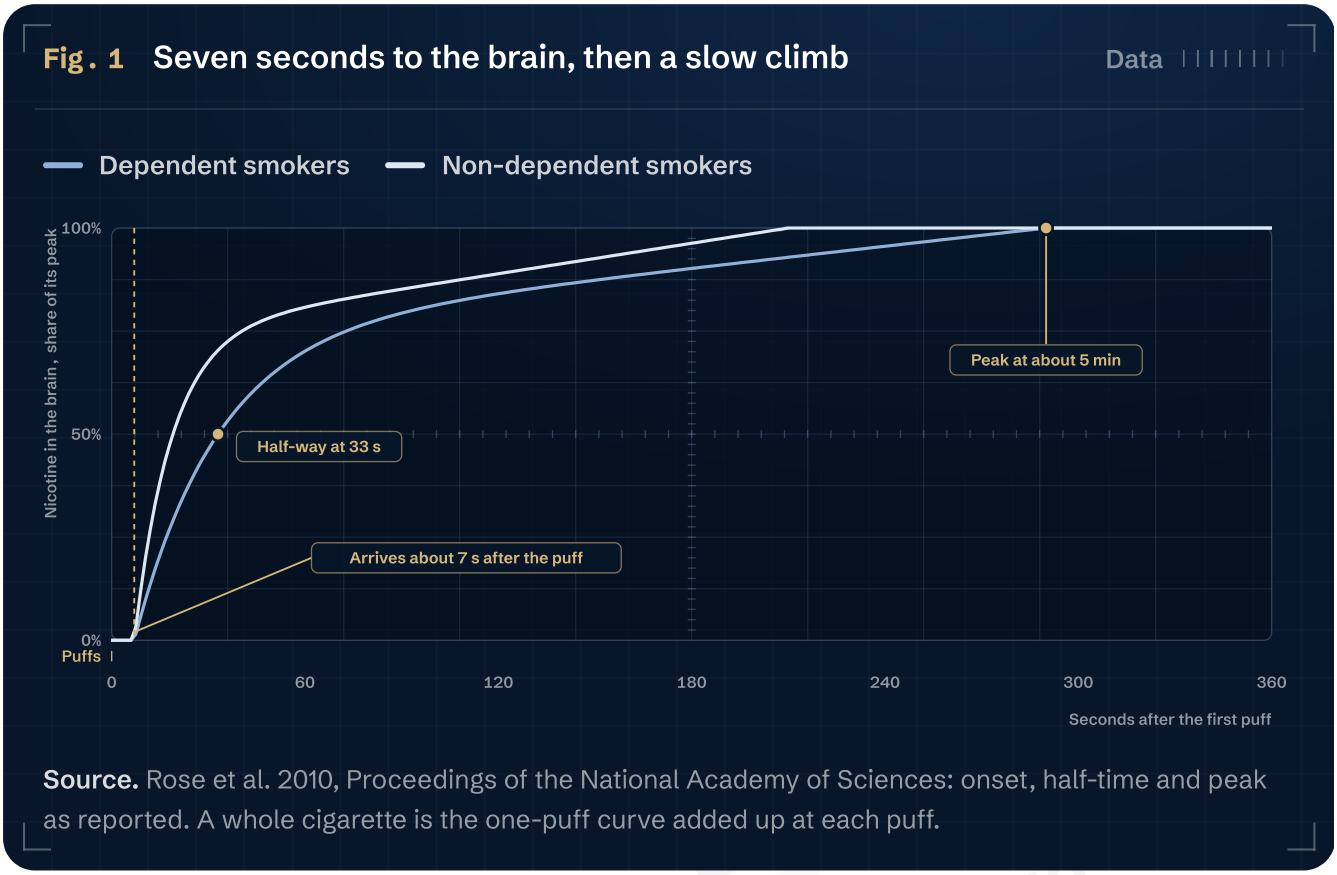


Figure 1. Nicotine in the brain after one puff, as a share of its peak, measured with PET by Rose and colleagues. It arrives about 7 seconds after the puff and climbs for several minutes. Switch to a whole cigarette and the puffs add up to a steady climb with no spike at each puff. Scrub the time to read the level and the puffs taken. The traces show the shape the study reported; the whole-cigarette view adds the one-puff curve at each puff.

Two details from that study change the usual picture of smoking. The first is that a whole cigarette does not send a spike of nicotine to the brain with every puff. Rose and colleagues found no puff-by-puff spikes in the brain; instead, the level rose gradually across the cigarette and reached its peak three to five minutes after the start[5]. The reward of a cigarette is a slow build, set going within seconds of the first draw. The second is that the brains of dependent smokers filled up more slowly, because nicotine washed out of their lungs more slowly, and they tended to make up for it by inhaling more smoke[5]. The authors concluded that speed alone cannot explain why some smokers become dependent and others do not. What speed does do is tie the act to its effect within seconds, and the brain learns that kind of link quickly.

3.2 A puff or two fills half the receptors

Nicotine acts on nicotinic acetylcholine receptors, and the type most tied to dependence is called alpha-4 beta-2. Brody and colleagues used PET scanning in 11 dependent smokers to measure how much of this receptor nicotine occupied after smoking different amounts. One or two puffs of a cigarette occupied half of the receptors, and they stayed half-occupied for 3.1 hours. A full cigarette occupied more than 88% of them and reduced craving[17]. Half of the receptors were occupied at a blood nicotine level of 0.87 nanograms per millilitre, which the authors note is about a twenty-fifth of the level in a typical daily smoker[17].

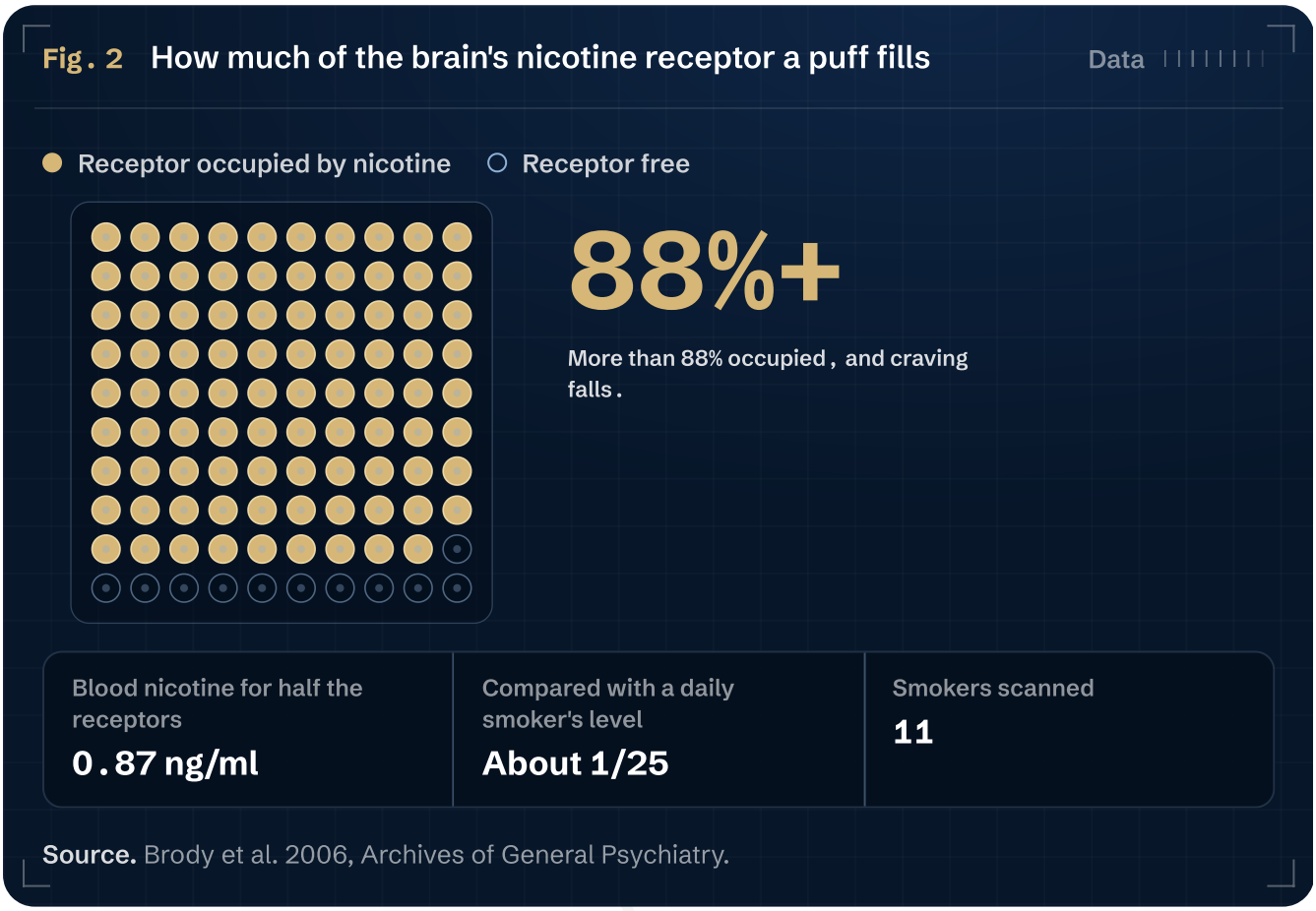


Figure 2. Each well is one hundredth of the alpha-4 beta-2 nicotinic receptors measured by Brody and colleagues in 11 smokers. Choose how much was smoked. One or two puffs occupied half; a full cigarette more than 88%. A smoker's usual level is about 25 times what it takes to fill half of them, which is why the receptors stay close to full all day.

That finding explains something smokers know from experience: a single cigarette after a long gap is enough to settle the craving, and cutting down from 20 a day to 10 often makes little difference to how the day feels. A daily smoker keeps these receptors close to full almost all day. The cigarette that matters most to the brain is the first one after a gap, because overnight the level falls and the receptors begin to empty. That is also why the time to the first cigarette of the morning is one of the

best single measures of how dependent someone is. Across four trials and an international survey, how soon after waking people smoked predicted whether they managed to stop better than any other single question[18].

3.3 Dopamine, wanting and the habit that runs itself

Filling the receptors releases dopamine in the brain's reward system. Brody and colleagues showed it in smokers with PET: smoking a cigarette released dopamine in the ventral striatum, the area most involved in learning what is rewarding, and in the 20 smokers studied, the more dopamine was released, the more the smoker's craving changed[19]. Dopamine does not so much make the cigarette feel good as mark it as important and worth repeating. Berridge and Robinson separated the brain's system for wanting a reward from its system for liking it, and showed that repeated drug use can strengthen the wanting, especially the wanting set off by triggers, without strengthening the liking[20]. Many smokers will say they do not much enjoy most of their cigarettes. They still want each one.

Repeated often enough, the wanting becomes a routine that runs without a decision. Everitt and Robbins describe addiction as a shift in control from the parts of the brain that weigh goals to the parts that run well-practised habits, with the triggers linked to the drug gaining a direct say in what happens next[21]. Wood and Rünger describe the same thing from the side of everyday habits: once a behaviour has been repeated in a stable context, the context itself starts it, with little reference to what the person wants at that moment[22]. Few habits are repeated as often, in contexts as stable, as smoking. The hand reaches for the pack at the end of the meal before the person has thought about it.

Koob and Volkow bring these pieces together as a cycle with three stages: the drug and its reward, which teach the habit; withdrawal and a low mood, in which the reward system responds less and the stress systems respond more; and a preoccupied stage, in which craving rises and the prefrontal cortex cannot hold it back[23]. Nicotine runs through the whole cycle many times a day. The cigarette rewards, the level falls, the lack of it is felt, the craving builds, and the next cigarette both rewards and relieves. Over time, the relief does more of the work. Benowitz puts it simply: smokers keep smoking partly for the pleasure and partly to avoid the discomfort of going without[7].

The brain also adapts. Nicotine causes the alpha-4 beta-2 receptors to multiply, and in smokers they are more numerous than in people who have never smoked[16]. Section 6 shows what happens to them after the last cigarette, and why that matters for the first month. The point here is that what makes nicotine hard to stop is not one thing. It is a fast, frequent reward, a habit tied to a hundred small moments in the day, and a brain that has adjusted to having the drug and complains when it is gone.

None of this means a smoker lacks willpower. Deliberate self-control is run by the prefrontal cortex, and it is the faculty most easily knocked offline by stress, tiredness and the presence of a trigger[24, 25]. Under stress, behaviour shifts from goal-directed control to habit[26]. And people are poor at predicting, when calm, how strongly they will want something in a hot moment later[27]. So

the decision to quit is made by a calm person in the morning and has to be carried out by a stressed, tired person at four in the afternoon, at the moment the routine is strongest. Quitting works when the routine is changed in advance, not when the person tries harder in the moment.

Section 04

Does smoking actually relieve stress?

In brief

Mostly it relieves the stress of withdrawal that nicotine itself creates. Between cigarettes the level falls and smokers feel worse; the next cigarette brings them back to normal. People who quit end up with less anxiety, depression and stress than people who keep smoking.

Smoking feels like it relieves stress, but mostly it relieves the stress that nicotine itself creates. Between cigarettes the nicotine level falls and the smoker becomes tense, irritable and unsettled. The next cigarette takes that away, so it feels calming. Parrott, reviewing the research, found that adult smokers report slightly more stress than non-smokers, that their mood is normal while smoking and worse between cigarettes, and that stopping reduces stress over time[28]. A large review found the same in the long run: people who quit end up less anxious, less depressed and less stressed than people who keep smoking[14].

4.1 The sawtooth of a smoking day

The shape of a smoker's day explains why the relief is real and why it does not last. Nicotine has a half-life in the blood of about two hours, so it builds up over the first six to nine hours of regular smoking and stays at a raised level through the day, rising with each cigarette and falling between them[16]. Benowitz and colleagues measured blood nicotine every two hours around the clock in 12 smokers and found that levels differed widely from person to person, even when people smoked the same number of identical cigarettes[29]. The number of cigarettes is a rough guide to how much nicotine someone takes in, not a measure of it. Overnight the receptors recover from the day's nicotine, which, Benowitz notes, is part of why the first cigarette of the morning is often described as the most rewarding[7].

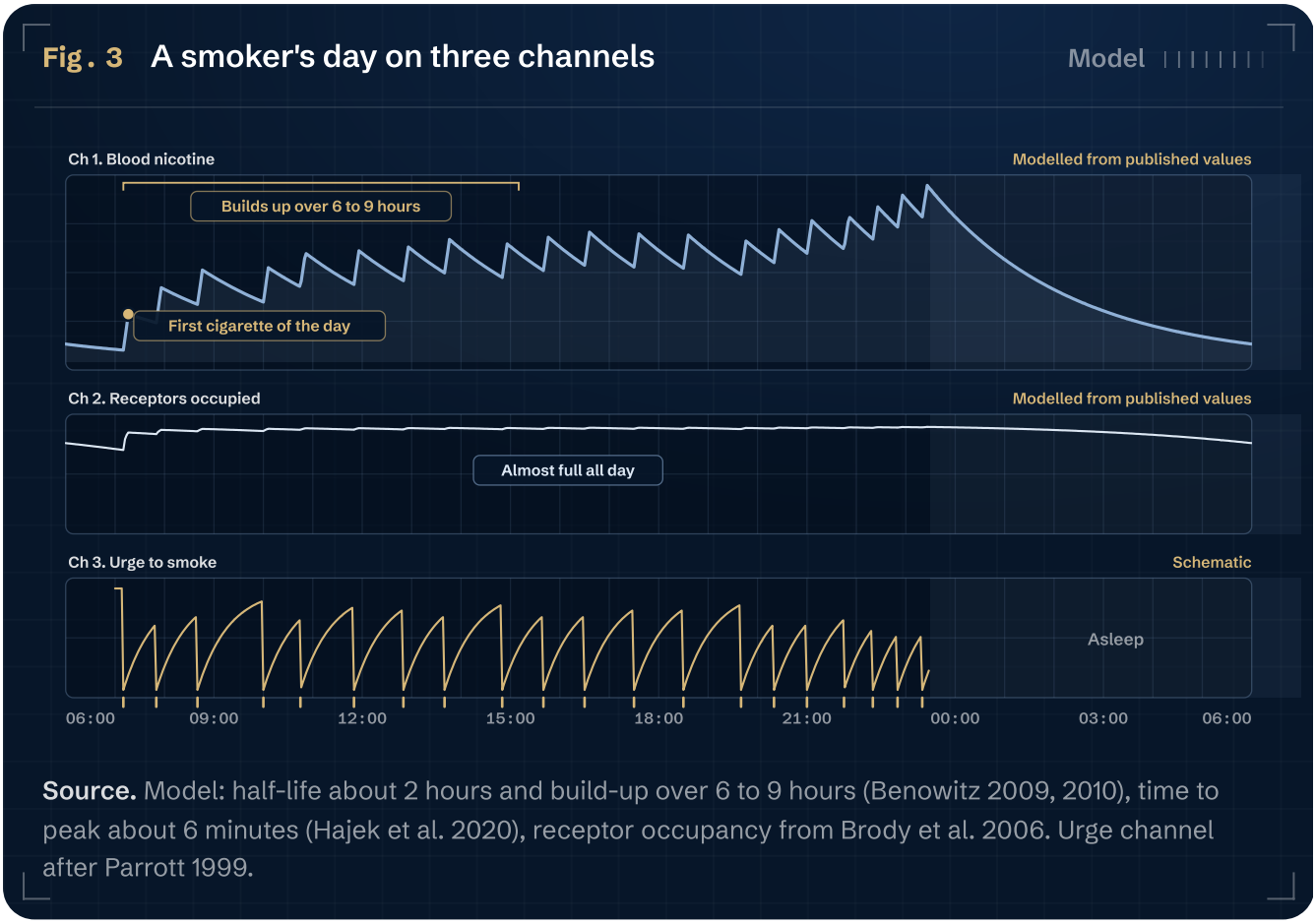


Figure 3. Twenty cigarettes across a day, modelled from published values. Channel 1 is blood nicotine, which builds through the morning and drains overnight. Channel 2 is the share of receptors occupied, which stays near full all day because a smoker's level is far above what fills half of them. Channel 3, drawn schematically, is the urge: it climbs between cigarettes and drops after each one. Scrub the time of day to read all three. The model is ours; the half-life, build-up, time to peak and occupancy values are from the studies named under the plate.

Put the three channels together and the stress relief looks different. The receptors stay close to full all day, so the brain is not short of nicotine for long. What changes from hour to hour is the small fall after each cigarette, and the urge that grows as the level drops. The smoker feels that fall as tension, restlessness or a vague sense of something missing. The cigarette takes it away. Parrott calls this the core of the problem: the relaxation smokers feel from a cigarette is real, but it is mostly the reversal of a tension that nicotine dependence causes in the first place, and non-smokers do not have that tension to relieve[28].

This also explains why smokers feel they need a cigarette most under stress. Stress and the fall in nicotine feel similar from the inside, and both make the prefrontal cortex less able to hold back a strong habit[24]. A cigarette at that moment fixes the withdrawal part of the feeling, and the person concludes that it fixed the stress. Over years, the routine gets tied to every difficult moment in the day, and stopping feels like losing the only tool for handling them.

4.2 What happens to mood after quitting

The best test of whether smoking helps mental health is to look at what happens when people stop. Taylor and colleagues pooled 26 studies that measured mental health in smokers before quitting and then between seven weeks and nine years after, comparing people who stopped with people who kept smoking. People who stopped ended up with less anxiety, less depression, less mixed anxiety and depression, and less stress, and with better psychological quality of life and more positive mood. The improvements were seen in people with and without mental health conditions, and the authors note they were equal to or larger than the effects of antidepressants for mood and anxiety disorders[14].

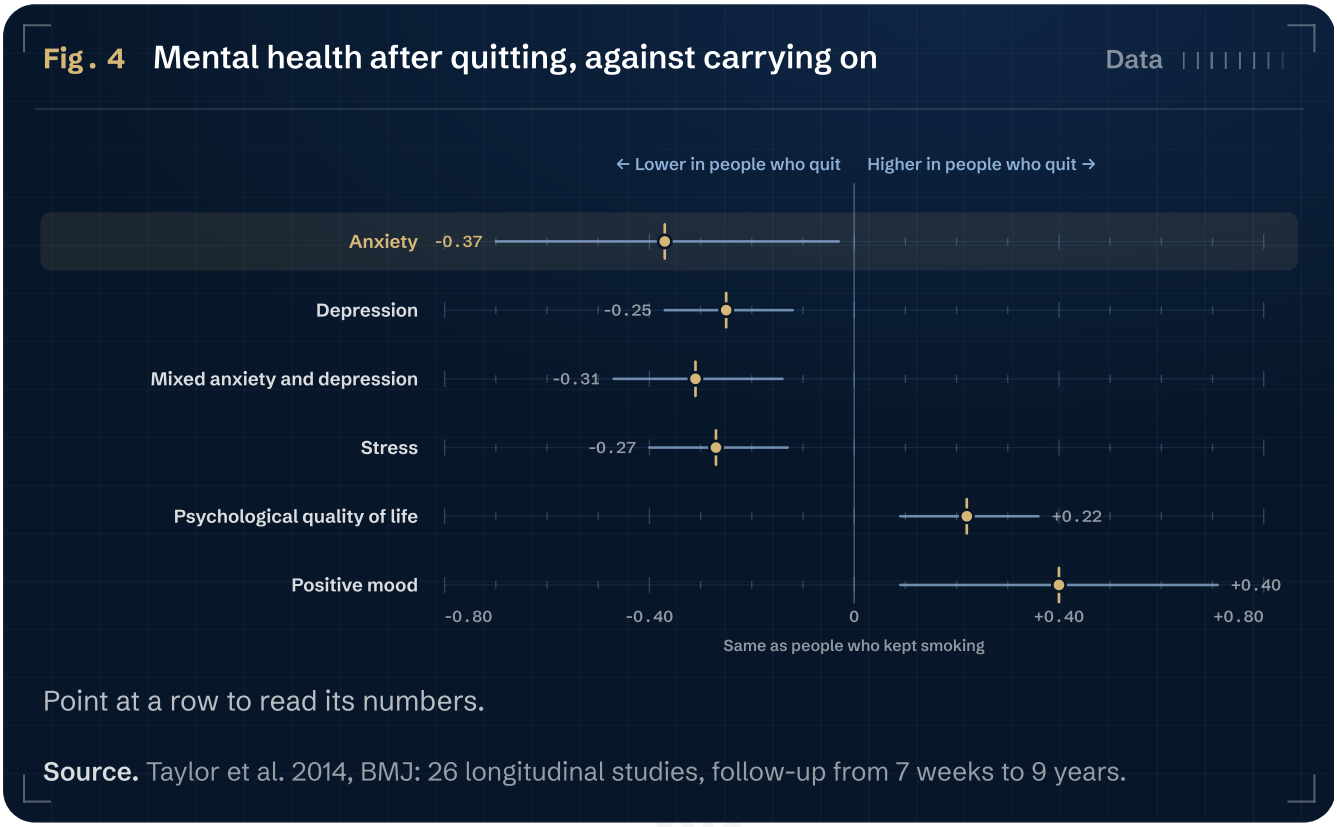


Figure 4. Six meters from Taylor and colleagues' meta-analysis of 26 studies. Each gold needle is the pooled difference between people who stopped smoking and people who kept smoking, in standardised units; the steel bar is the 95% confidence interval. Every interval sits on the side of people who stopped. Point at a row to read its numbers.

These were observational studies, so they cannot fully rule out that people whose mood was improving for other reasons were also more likely to quit. There was also no sign that the size of the improvement differed between the general population and people with physical or psychiatric conditions[14]. The direction is also what the mechanism predicts. Once the cycle of falling level and relief is gone, so is a source of tension that recurred many times a day. In the short term the picture is the other way round. Low mood, anxiety and irritability rise in the first days after stopping and

peak within the first week[2]. That is the price of the long-term gain, and it is one reason the program works on sleep, exercise and stress for two weeks before the stop date, rather than asking the person to meet that week with nothing else in place.

One more finding matters for anyone who smokes to cope with stress. In a study that followed 235 people who quit on their own for a year, neither their stress levels before quitting nor rises in stress after quitting predicted who relapsed[30]. In a week-long record of every cigarette smoked by 304 heavy smokers, mood had little link to when they smoked; the urge itself and the situation did[31]. Stress matters, and Section 5 shows it often sets off the first cigarette after stopping. But the belief that a person cannot stop until their life is less stressful is not supported by the evidence. People stop smoking in stressful lives all the time, and they end up less stressed for it.

Section 05

What triggers the urge to smoke?

In brief

Places, times, activities and people that have gone with smoking many times before: coffee, meals, breaks, the car, the end of a task, alcohol, other smokers, and stress. Each one sets off craving on its own. After quitting, being around other smokers, drinking and bad moods are the most common settings for the first cigarette.

The urge to smoke is set off mostly by the places, times, activities and people that have gone with smoking many times before. For most smokers that means the first coffee, the end of a meal, a break at work, the car, finishing a task, a drink, being with other smokers, and a stressful moment. The brain has learned to expect nicotine in each of those settings, so arriving in one sets off craving even when no cigarette is in sight[32]. After quitting, the first cigarette most often comes when other smokers are around, cigarettes are easy to get, alcohol is involved or the person is in a bad mood[30, 33].

This learning is one of the most reliable findings in addiction research. Carter and Tiffany pooled studies in which people with an addiction were shown things linked to their drug, such as a lit cigarette, a pack or someone smoking, and found that those things reliably raised craving, with smaller effects on heart rate and sweating[34]. Conklin and colleagues showed that the setting alone is enough. They asked 72 smokers to photograph the places where they did and did not usually smoke, and then showed them those photographs with no cigarettes, lighters or ashtrays in view.

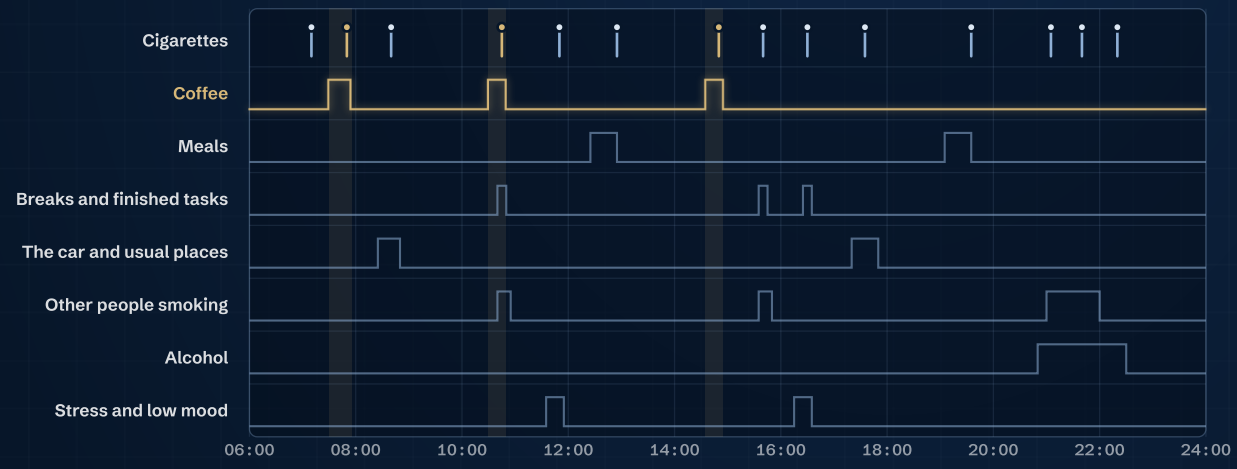
Photographs of their own smoking places raised craving more than standard pictures of smoking settings, and raised heart rate too[32]. The kitchen doorway, the bench outside the office or the driver's seat can set off an urge by being itself.

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Fig. 5 An example smoking day, read on a logic analyser

Channels

An example day, drawn for illustration. The findings are from the studies cited.



Coffee

In 304 smokers who logged every cigarette for a week, smoking was modestly more likely with coffee[31]. Smoking also speeds up how fast the liver clears caffeine, so the same cup behaves differently once you stop[1].

Meals

Eating was one of the situations most tied to smoking in the same week-long record[31], which is why the cigarette after a meal is so hard to give up.

Breaks and finished tasks

After quitting, temptations were most often put down to moving from one activity to the next, such as finishing a task or starting a break[33].

The car and usual places

Photographs of smokers' own smoking places raised craving more than standard smoking scenes, even with no cigarette in sight[32].

Other people smoking

First lapses came more often where smoking was allowed, cigarettes were easy to get and other smokers were present[33], and more smokers around a person predicted relapse[30].

Alcohol

Among 235 people who quit on their own, those who drank more before quitting were more likely to relapse[30].

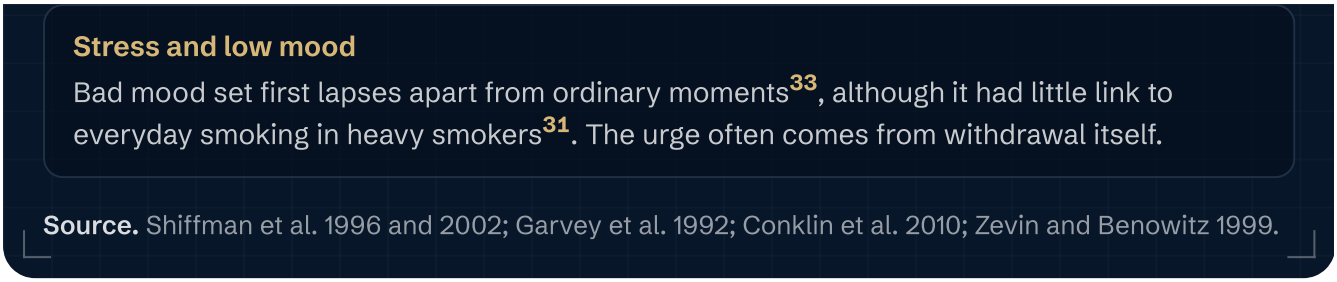


Figure 5. Cigarettes across an example day on the top channel, with one channel below for each common trigger. Point at a channel to light the cigarettes that fall inside its windows and to read what the cited studies found about it. The day is drawn for illustration. The findings are from the studies named.

5.1 What a week of real cigarettes shows

The clearest picture of what triggers ordinary smoking comes from studies in which smokers record every cigarette as it happens. Shiffman and colleagues had 304 heavy smokers carry a small computer for a week and log each cigarette, and also answer random prompts at times they were not smoking, which gave 10,084 smoking moments and 11,155 non-smoking moments to compare. Smoking was strongly related to the urge itself. It was modestly related to drinking coffee, eating, being with other smokers and certain activities, and to feeling restless. It had little to do with mood[31]. In heavy daily smokers, in other words, most cigarettes are not answers to a feeling. They are the next step in a routine, set going by an urge that the routine itself has taught.

The same group studied what happens after quitting. In a study of first lapses, people who had stopped recorded their temptations and any cigarettes in real time. Lapses were set apart from the temptations people resisted by bad mood, by being where smoking was allowed, by cigarettes being at hand and by other smokers being present. Temptations were most often put down to moving from one activity to the next. People were 12 times more likely to report doing something to cope in a temptation they got through than in one that ended in a cigarette, and the coping that made a difference was the kind done in the head rather than with an action[33]. Shiffman and colleagues' summary of the field is that craving set off by triggers is a major cause of relapse, and that the steady background dose from a patch or a daily medicine does not fully protect against it[35].

That last point matters in practice. A nicotine patch keeps the receptors partly filled all day, which takes the edge off withdrawal. But a trigger produces a sudden, sharp urge on top of the background, and the patch does not change quickly enough to meet it. Ferguson and Shiffman note that a fast-acting form of nicotine replacement, such as gum, a lozenge or a spray, can be used at the moment of a sudden craving, which is part of why combining a patch with a fast-acting form works better than either alone (Section 11)[35, 36]. Medicines take the floor up. A plan for each trigger deals with the spikes.

5.2 Coffee, meals, the car and the break

Coffee and cigarettes go together for three reasons. They are often taken at the same moments, so the learned link is strong. Many people smoke their first cigarette with their first coffee, when the overnight fall in nicotine makes the craving strongest[7]. And smoking speeds the clearance of caffeine, so heavy coffee drinkers who stop smoking can find the coffee hits harder than it used to[1]. Meals work in the same way. The cigarette after eating is one of the most firmly learned in the day, partly because it is so regular and partly because eating marks the end of an activity, and transitions between activities are when temptation tends to come[33].

The car, the walk to the station and the bench outside work are triggers because they are places where the person has smoked hundreds of times, often alone and with nothing else to do with their hands. No study we found measured driving as a trigger on its own, but the research on personal smoking settings applies directly: a place where someone has often smoked raises craving by itself[32]. A smoking break at work is a trigger twice over. It is a transition, and it is social, often with the same people at the same time each day. Removing access, changing the route and doing something different in those exact places is more effective than meeting the same place every day with resolve. Duckworth and colleagues' review of self-control found that changing the situation before an urge begins works better than resisting an urge already under way[37].

5.3 Alcohol and other smokers

Alcohol is the trigger that most often ends an attempt to stop. Among 235 people who quit on their own and were followed for a year, those who drank more before quitting were more likely to relapse, and so were those who spent more time around other smokers[30]. Drinking lowers self-control in general, often happens in the same places and with the same people as smoking, and for many people the cigarette with a drink is the one they never gave up. A first evening out after the stop date is a high-risk event, and it is better planned in advance than met on the night.

Other people's smoking matters even beyond the moment. Christakis and Fowler followed 12,067 people in the Framingham Heart Study over 32 years and found that smokers tended to stop in clusters. When a person's spouse stopped smoking, that person's chance of smoking fell by 67%. A sibling stopping lowered it by 25%, a friend by 36%, and a co-worker in a small firm by 34%. Neighbours made no difference[38]. These were observational links, not proof that one person's stopping caused another's, but they show how much smoking is held in place by the people around it.

Fig. 6 How stopping spreads through the people around you Data



Source. Christakis and Fowler 2008, New England Journal of Medicine.

Figure 6. From Christakis and Fowler's study of 12,067 people. The width of each tie is how much a person's chance of smoking fell when that contact stopped. Neighbours had no effect. Point at a person to read the figure and its confidence interval. These are observed associations in one long-running study, not measured effects of any one person's choice.

For someone stopping, this cuts both ways. A partner who smokes, a team that takes breaks together and a group of friends who smoke when they drink all make stopping harder, and the same people stopping, or supporting the attempt, make it easier. Adam, a crypto investor and founder in Vietnam who came to us with nicotine, junk food and social media, said of this part: “When you want to overcome any addiction, addiction for porn or smoking, you need some like-minded people who can support and help you, otherwise it's very difficult to be alone.” Section 14 sets out where the program works on the people and places around the habit.

5.4 Stress, low mood and the urge itself

Stress and bad moods are a different kind of trigger. In heavy smokers' everyday smoking, mood had little link to when they lit up[31]. After quitting, though, bad mood was one of the things that set apart the moments that ended in a cigarette[33]. Part of the reason is that withdrawal itself causes low mood, irritability and anxiety in the first weeks[2], so the person is having more bad moments at the same time as they have lost their usual way of ending them. And part is that stress weakens deliberate control and shifts behaviour toward habit[24, 26]. A stressful afternoon in the second week is when the routine is most likely to run.

The last trigger is the urge itself. Once it starts, it is easy to treat it as an instruction. But an urge rises, peaks and falls whether or not the person smokes. Bowen and Marlatt taught 123 college students who smoked a short technique called urge surfing, watching the urge rise and fall without acting on it. It did not make their urges weaker, but over the following week they smoked fewer cigarettes[39]. A brief bout of exercise also helps in the moment. In all 12 studies Taylor and colleagues reviewed that compared a bout of exercise with sitting still, the exercise reduced cigarette cravings, with the effect lasting up to 50 minutes, and in four studies people went two to three times longer before their next cigarette. Even five minutes of muscle tensing helped. Most of these studies tested smokers who were abstaining for a few hours for the experiment, not people in the weeks after quitting[40]. Neither of these removes the trigger. Both change what the person does in the minutes after it.

Section 06

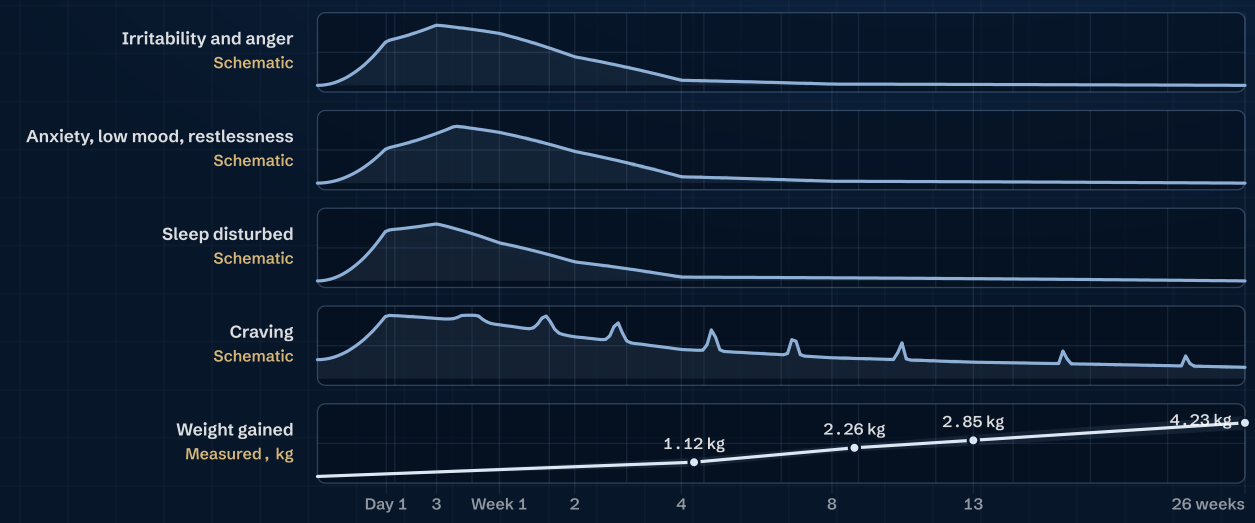
How long does nicotine withdrawal last?

In brief

Most withdrawal symptoms, such as irritability, anxiety, low mood, restlessness, poor concentration and bad sleep, peak in the first week and fade over 2 to 4 weeks. Hunger, weight gain and craving last longer, often for months. The brain's nicotine receptors are back to a non-smoker's level by about 6 to 12 weeks.

Most nicotine withdrawal symptoms peak in the first week and are gone within two to four weeks. Hughes reviewed 120 studies and found that anger, anxiety, depression, difficulty concentrating, impatience, insomnia and restlessness are the true symptoms of nicotine withdrawal, and that they peak within the first week and last two to four weeks[2]. Craving, hunger and weight gain are different. In a trial of 315 people stopping smoking, most symptoms were back to their pre-quit level by one month, but hunger, weight gain and craving carried on for six months in many people[41]. So the first month is the hard part for most of the symptoms, and craving is the one to plan for over the longer term.

Fig. 7 The six months after the last cigarette, on five channels Strip chart



Source. Symptom time course: Hughes 2007; Hughes et al. 1991. Craving set off by triggers: Ferguson and Shiffman 2009. Weight: Aubin et al. 2012, untreated quitters.

Figure 7. A strip chart of withdrawal on a stretched time axis, so the first days are wide enough to read. The first four channels are schematic shapes drawn to the time course Hughes reports: most symptoms peak in the first week and settle within 2 to 4 weeks, while craving falls slowly with sudden spikes and is still present at six months in many people. The weight channel is measured: mean gain in people who quit without treatment, with its 95% confidence band. Scrub the day to read every channel.

Symptoms start fast. McCarthy and colleagues had 70 smokers record their symptoms several times a day on an electronic diary before and after their quit day. Every symptom except hunger rose on the quit day itself and stayed raised for three weeks. The study also found that people's experiences grew more different from one another after quitting, and that a rise in craving on the quit day was linked to a lower chance of still not smoking three months later[42]. That last finding is one reason the first days deserve a plan rather than a hope: how hard they hit is not just discomfort, it is a signal of risk.

Withdrawal differs from person to person. Piasecki and colleagues found that smokers who were more dependent, older and more prone to negative moods had more severe withdrawal, and that women, heavier smokers and people with a history of depression had more up-and-down symptoms. Nicotine patches and bupropion made withdrawal less severe, but they did not change how quickly symptoms settled, how much they swung from day to day, or how sharply they rose after a cigarette[13]. Medicines take the edge off. They do not do all of the work.

6.1 Sleep, dreams, coughing and the less familiar symptoms

Sleep is often worse in the first weeks. Jaehne and colleagues reviewed 52 studies of nicotine and sleep. Smokers already sleep worse than non-smokers: they take longer to fall asleep, wake more often, get less deep sleep and are sleepier in the day, and nicotine suppresses dream sleep. Stopping brings a period of broken sleep, and the sleep problems and low mood of withdrawal were linked to lower rates of staying stopped[43]. Hughes lists increased dreaming as a likely effect of stopping, along with constipation, coughing, dizziness and mouth ulcers[2]. Many people are not warned about these and take them as a sign that something is wrong. They are more likely a sign of the body adjusting to life without nicotine, and anything that persists or worries you is worth showing a doctor.

Hughes also lists things that are not withdrawal. Drowsiness, tiredness and several physical complaints did not hold up as true symptoms of stopping in his review[2]. In practice, people in their first fortnight often blame everything on withdrawal. Some of it will be withdrawal; some will be poor sleep, extra coffee that is now cleared more slowly (Section 2), or an ordinary bad week. Keeping a short nightly record makes it easier to see which, and to see the symptoms easing day by day.

6.2 What the receptors are doing

Underneath the symptoms, the brain is resetting. Smoking leaves the brain with more alpha-4 beta-2 receptors than it would otherwise have[16]. Staley and colleagues scanned smokers about a week after their last cigarette and found receptor levels 26 to 36% higher across the cortex and 27% higher in the striatum than in people who had never smoked. The more receptors a person had, the stronger their urge to smoke to relieve withdrawal[44]. The authors' point was that when people stop smoking, they do so in the face of a large rise in the very receptors nicotine used to fill.

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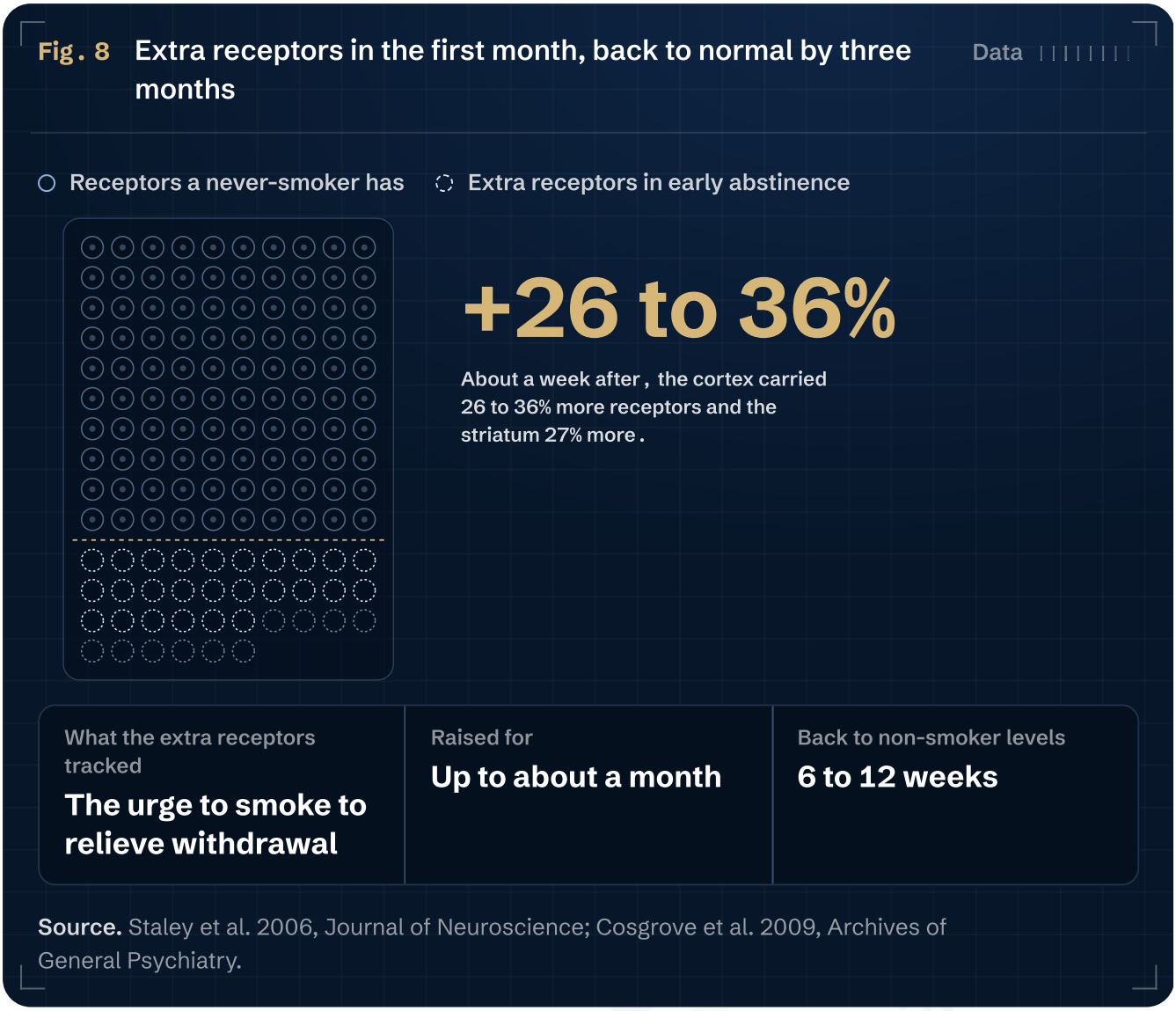


Figure 8. The same plate, now counting receptors. A never-smoker's level is 100 wells; the dashed wells are the extra receptors measured in smokers about a week after stopping, with the faint wells showing the range across brain regions. Step through the weeks. The data come from two SPECT studies with small groups: Staley and colleagues, and Cosgrove and colleagues, who followed 19 smokers through up to four scans.

Cosgrove and colleagues then followed 19 smokers through up to four scans over three months without smoking. At one day, levels were no different from non-smokers', which may be because nicotine still in the body was occupying the receptors and hiding them from the scan. At one week, they were clearly higher. At four weeks and at six to twelve weeks, they were no longer different from non-smokers', and they were lower at six to twelve weeks than at one week. The authors concluded that the raised levels last up to about a month and return to normal by six to twelve weeks[45]. These were small studies, and they measured receptors, not feelings. But the timing matches what people describe: a brain that is very different in the first weeks and settling by the third month.

Marcel R., a commercial director in the Netherlands who came to us to stop weed, cigarettes and phone scrolling after at least ten attempts over 15 years, described that time course from the inside: “It can be painful, emotions come up, sleep gets disturbed. It's a true process, like the first few weeks felt like months and then the last few weeks flew by like it was days.” That is one person's experience, not a prediction. It is a fair description of the curve in Figure 7.

6.3 Withdrawal is not what decides who stays stopped

It would be natural to assume that the people with the worst withdrawal are the ones who go back. The evidence is more mixed than that. In the trial of 315 people by Hughes and colleagues, those with more intense withdrawal were not more likely to relapse[41]. In McCarthy's diary study, a sharp rise in craving on the quit day and a rise in low mood before it did predict relapse[42], and Jaehne's review found that low mood and poor sleep during withdrawal were linked to lower abstinence[43]. What these findings have in common is that low mood, poor sleep and craving matter more than the overall intensity of withdrawal. Those are the parts the program prepares for in the two weeks before the stop date: sleep, daylight, exercise and stress first, then the stop.

Section 07

How long do cravings last, and when is relapse most likely?

In brief

Each craving rises and passes, but cravings keep coming for weeks and can return months later when a trigger appears. Relapse is most likely in the first eight days, still common in the first three months, and possible long after.

A single craving rises, peaks and falls whether or not the person smokes. Cravings as a whole last longer. They are most frequent in the first weeks and thin out over months, but in many people they are still there at six months[41], and a trigger can set off a strong one long after the last cigarette[35]. Relapse follows the same shape. In people who quit without help, most relapse happens in the first eight days[3]. In one study of 235 people who quit on their own, 62% had relapsed within two weeks[30].

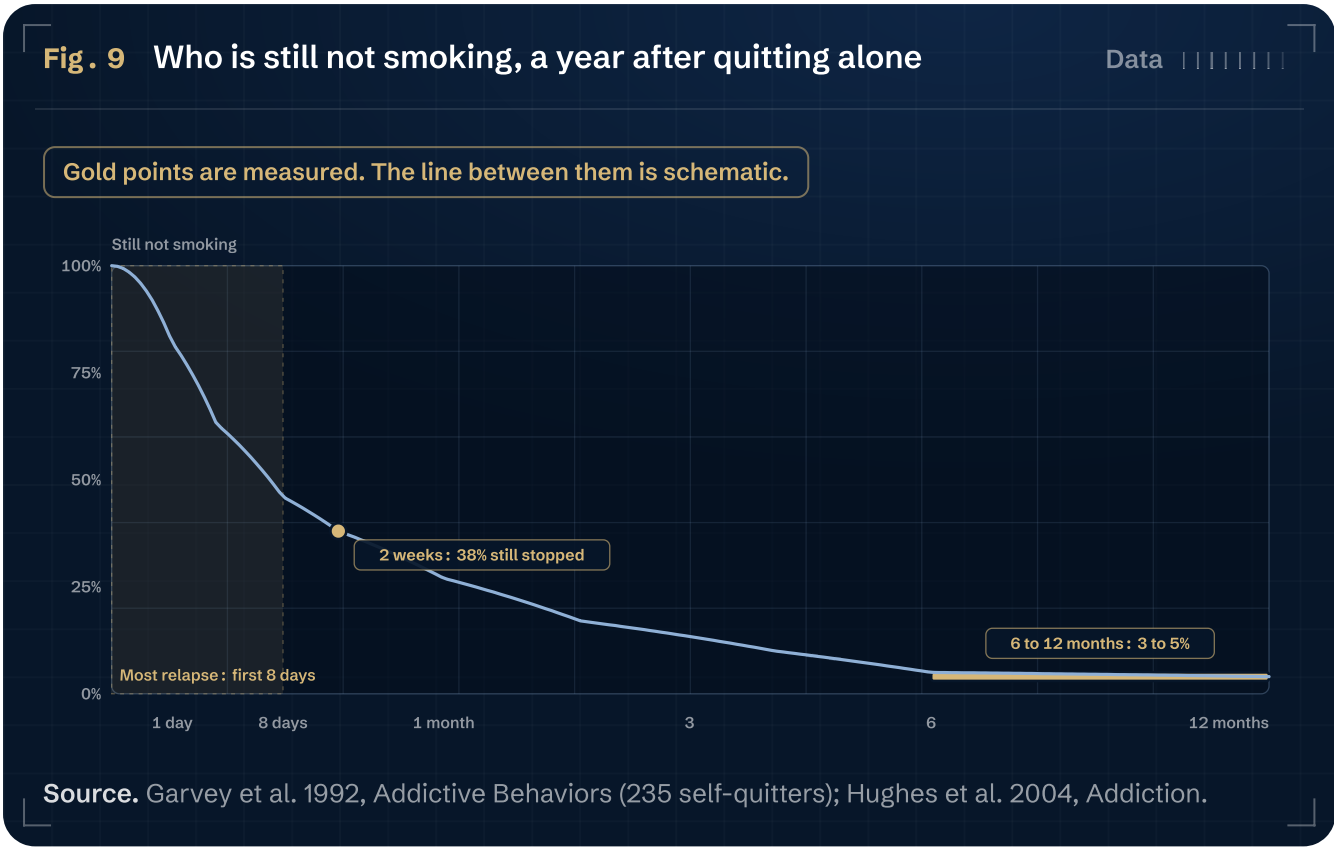


Figure 9. The share of people who quit without help who are still not smoking, across the first year on a stretched time axis. The gold points are measured: 38% at two weeks in one study, and 3 to 5% at six to twelve months across studies. The line between them is schematic. The first 8 days, when most relapse happens, are shaded. Add the people who smoked even once after quitting, of whom 95% went back to regular smoking in the same study.

Hughes and colleagues reviewed every study they could find that followed people who quit on their own or had no treatment in a trial. The relapse curves were steepest at the start, with most relapse in the first eight days, and only 3 to 5% of people who tried to quit on their own achieved six to twelve months of continuous abstinence after a given attempt[3]. Their advice for anyone designing help was to focus on the first week. Kirshenbaum and colleagues found the same shape in relapse curves across studies of alcohol, tobacco and other drugs: losses are steepest soon after stopping and slow down as time without the drug builds up[46].

Low figures like 3 to 5% can be read as a reason for despair. They are better read as a measure of how weak an unplanned, unsupported attempt is. The same people, given a medicine and support, do several times better (Section 11)[4]. And each attempt teaches something, if it is looked at closely enough to see where it broke. In Garvey's study, people who had lasted longer on earlier attempts were less likely to relapse this time[30].

7.1 One cigarette

The finding in this section that matters most in practice is the one about a single cigarette. In Garvey's study, people who smoked any cigarette at all after their quit date had a 95% probability of going back to their usual smoking[30]. That does not mean one cigarette makes relapse certain. It means that, for people quitting on their own with no plan for it, one cigarette almost always became many. The reasons are the ones in Section 3: one cigarette refills the receptors, sets off the reward system and wakes up every learned link to the triggers around it[17, 47]. And it changes what the person thinks about themselves. Section 13 covers what to do if it happens.

This is also why smokers who stop are told to stop completely. A rule like “just one with a drink on Fridays” keeps alive the exact pattern that ends most attempts. Bouton's work on how learned responses come back shows why: when a habit is suppressed rather than unlearned, returning to the old context, or a single exposure to the old reward, can bring the whole response back[47].

7.2 What predicts relapse

Several things predict relapse well, and most of them can be planned for. In Garvey's study, relapse was more likely in people who drank more before quitting, who had less confidence in stopping, whose confidence fell after stopping, and who had more smokers around them. Age, sex, education and stress did not predict it[30]. In the real-time study of first lapses, they came with bad moods, in places where smoking was allowed, with cigarettes easy to get and other smokers present[33]. A higher dependence level, best measured by how soon after waking someone smokes, also predicts a harder time[18]. Put together, the predictors describe a person who meets the first weeks with cigarettes in the house, smoking friends, drinks on the calendar, low confidence and no plan. Each of those can be changed before or soon after the stop date.

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Table 2. What the studies found about relapse after quitting smoking, and what each finding suggests for someone stopping. Every row is from the study cited; the right-hand column is our reading of what it means in practice.

Finding	Study	What it suggests
Most relapse happens in the first 8 days	Review of self-quitters and untreated groups[3]	Plan the first week in detail before the stop date
62% of people quitting alone had relapsed by 2 weeks	235 self-quitters followed for a year[30]	The first fortnight needs support, not just resolve
Any cigarette after quitting: 95% went back to regular smoking	The same study[30]	Stop completely, and have a plan for the hours after a cigarette if one happens
More drinking and more smokers around predicted relapse; stress did not	The same study[30]	Plan drinking occasions and smoking company in advance
First lapses came with bad moods, where smoking was allowed, with cigarettes at hand and smokers present	Real-time reports of first lapses[33]	Remove access; prepare for low moods; change where breaks are taken
Craving set off by triggers drives relapse; steady medication does not fully block it	Review of trigger-set craving[35]	Pair any daily medicine with a fast-acting form and a plan for each trigger
A sharp rise in craving on the quit day predicted relapse at 3 months	Diary study of 70 smokers[42]	Treat a hard first day as a reason to lean on support, not as failure

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Section 08

Is it better to quit all at once or cut down first?

In brief

All at once. In the largest trial to compare them, more people who stopped on a set day were still not smoking at four weeks and at six months than people who cut down first, even among those who said they preferred to cut down.

It is better to stop all at once. Lindson-Hawley and colleagues randomized 697 smokers in English general practices to stop on a set day or to cut down by three quarters over the two weeks before that day. Both groups had the same support and nicotine replacement. Four weeks after the quit day, 49.0% of the people who stopped all at once were not smoking, checked by a breath test, against 39.2% of the people who cut down first. At six months the figures were 22.0% and 15.5%[12]. Even people who said at the start that they would rather cut down did better when they were asked to stop on the day.

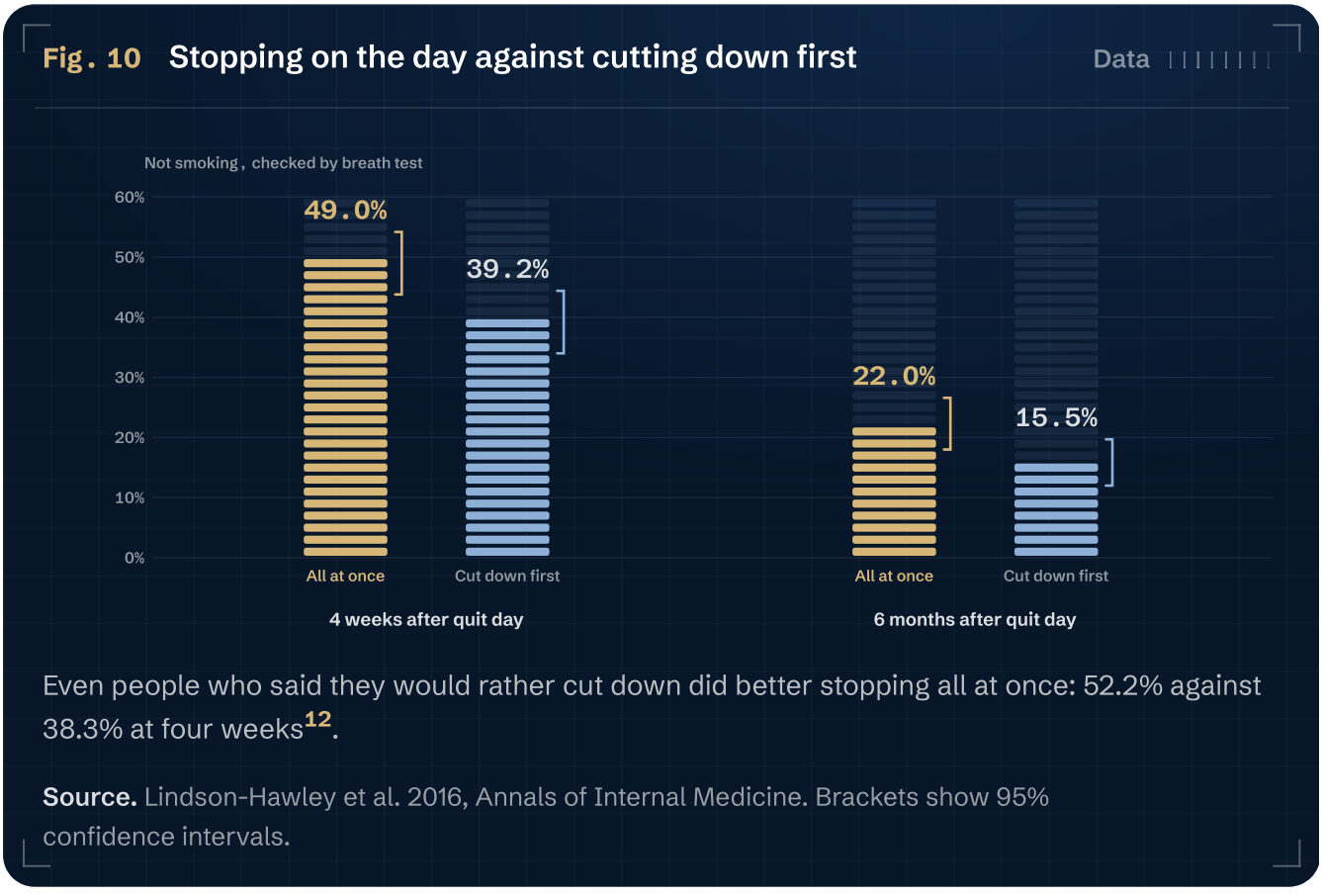


Figure 10. LED meters from Lindson-Hawley and colleagues' trial of 697 smokers, all given support and nicotine replacement. Each lit segment is two percentage points of people not smoking, confirmed by a breath test; the brackets show 95% confidence intervals. Stopping all at once came out ahead at four weeks and at six months.

The result makes sense once the receptors are in view. Two puffs fill half of them, and a full cigarette more than 88%[17]. Cutting from 20 to 10 a day removes half the cigarettes but not half the nicotine effect in the brain, and it keeps every trigger in use, because each remaining cigarette is still smoked in a familiar place at a familiar time. The count is also a poor guide to the dose: Benowitz and colleagues found that the number of cigarettes did not predict well how much nicotine a person took in[29]. Cutting down sounds like halfway to stopping. To the brain it is often closer to smoking.

Cutting down also turns every remaining cigarette into a decision, many times a day. Each one is a negotiation about whether now is the time for one of the allowed ten. A complete stop removes the negotiation, which is part of why people find it easier after the first week than they expected. The trial does not show that cutting down is useless. It shows that, given the choice, stopping on the day works better[12].

There is a related question about switching to lighter cigarettes. In Benowitz's study, very low-nicotine research cigarettes did lower blood nicotine, and smokers given high-nicotine cigarettes smoked them less hard, so the body partly adjusted its intake. But daily intake varied so widely from person to person that neither the number of cigarettes nor the strength on the label predicted it well[29]. Switching cigarettes changes the dose by an amount nobody can see. The routine, the triggers and the dependence stay where they were.

Section 09

Is vaping easier to quit, and how do you quit vaping?

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In brief

Vapes can deliver nicotine as fast and as strongly as cigarettes, so they are not automatically easier to stop. As a way to stop smoking, nicotine e-cigarettes work better than nicotine replacement, but most people who switch keep vaping. Stopping vaping uses the same approach as stopping smoking, and support helps.

Vaping is not automatically easier to quit than smoking, because modern pod vapes can deliver nicotine about as fast and as strongly as a cigarette. In a study by Hajek and colleagues, five minutes with a pod vape raised blood nicotine to a peak of 20.4 nanograms per millilitre in 4 minutes, against 19.2 in 6 minutes for the same people's own cigarettes, with almost the same total exposure over half

an hour[48]. Stopping vaping uses the same approach as stopping smoking: a set day, a plan for each trigger, and support. In a trial of 2,588 young people who vaped, a text-message support program raised the share who stopped, 24.1% against 18.6%[49].

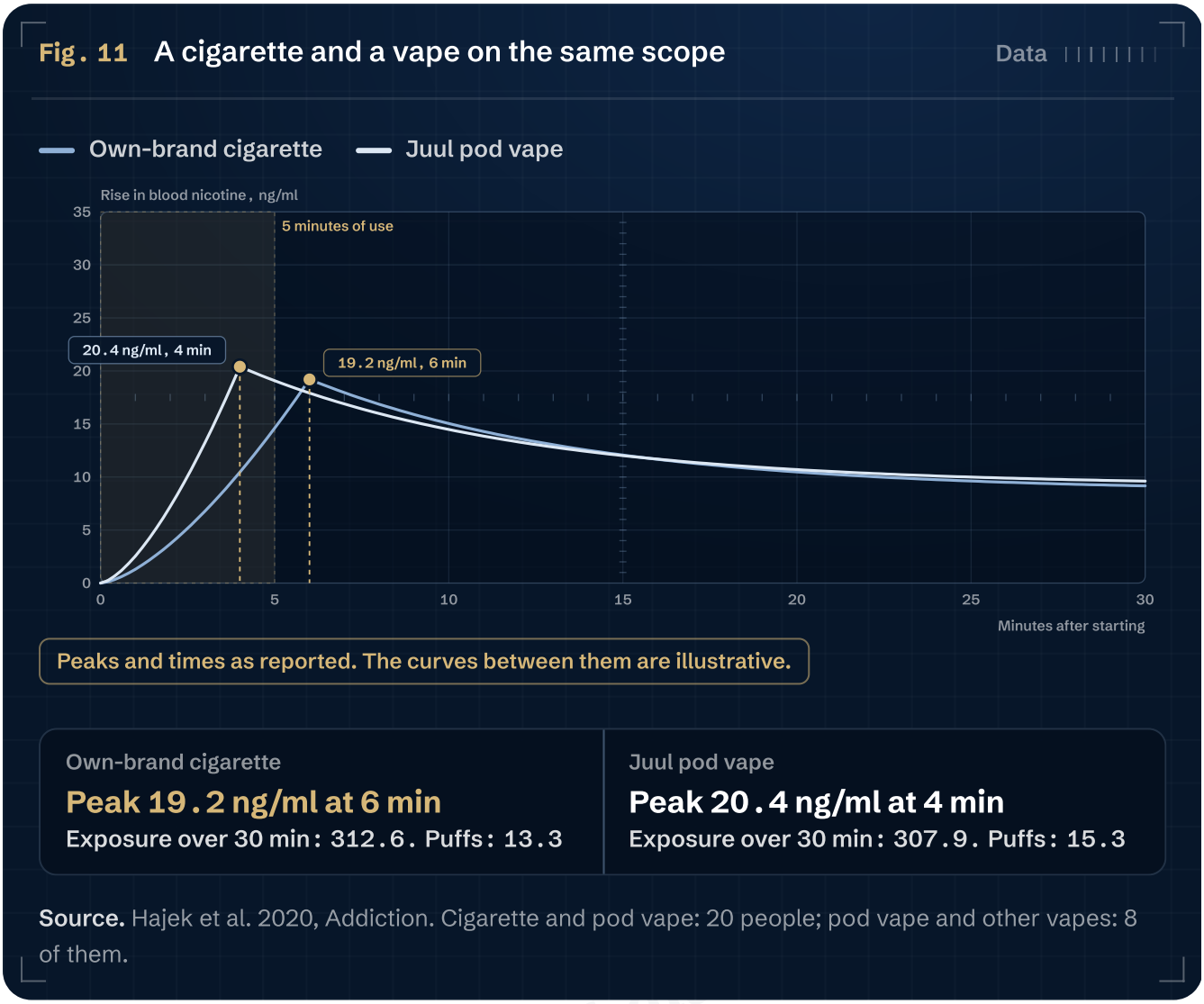


Figure 11. Rise in blood nicotine after five minutes of use following an overnight break, from Hajek and colleagues. The gold markers and the readout are the reported peak, time to peak, exposure over 30 minutes and puffs; the curves between them are illustrative. Switch comparisons to see how much vapes differ from one another: the pod vape delivered almost three times the peak of other e-cigarettes tested in the same people.

The detail of Hajek's study shows why vaping can hold people as firmly as smoking. The 20 people tested were all used to both cigarettes and e-cigarettes. After an overnight break they used each product for five minutes. The pod vape matched the cigarette on peak, time to peak and total exposure. In a subgroup of eight people who also tried other e-cigarettes, the pod vape gave a peak of 28.9 against 10.6 nanograms per millilitre, reached in 4 minutes against 6.3, and it reduced the

urge to smoke faster than the other e-cigarettes did[48]. Vapes are not one product. The ones that deliver nicotine fastest are the ones that most resemble a cigarette to the brain, and the ones that are hardest to put down.

Vaping also changes how often nicotine is taken. A cigarette is a separate event: you go outside, light it, smoke it and it is finished. A vape is in the pocket, can be used indoors and has no natural end. Many people who vape take a few puffs dozens of times an hour without noticing. In the young adults in Graham's trial, 82.3% vaped within 30 minutes of waking[49], which in smokers is a marker of strong dependence[18]. The triggers attach to more of the day, and there are fewer natural gaps in which the habit gets interrupted.

9.1 Vaping to stop smoking

As a way to stop smoking, nicotine e-cigarettes work. The Cochrane review by Lindson and colleagues found high-certainty evidence that nicotine e-cigarettes help more people stop smoking than nicotine replacement: a risk ratio of 1.59, from 7 studies and 2,544 people, which works out at about four more people stopping for every 100 who try[50]. In the largest of those trials, Hajek and colleagues randomized 886 smokers in English stop-smoking services to e-cigarettes or nicotine replacement, with weekly support for at least four weeks for both. At one year, 18.0% of the e-cigarette group had stopped smoking, against 9.9% of the nicotine replacement group[51].

The same trial shows the cost. Of the people who stopped smoking with e-cigarettes, 80% were still vaping at one year; of those who stopped with nicotine replacement, 9% were still using it[51]. Moving to a vape can end smoking. But it is a change in how nicotine is taken, not an end to nicotine dependence, and for many people it is the start of a second habit to quit. People who come to us often want both: to stop smoking and to stop needing anything in its place.

9.2 How to quit vaping

Research on stopping vaping is much younger than research on stopping smoking, and there is far less of it. What exists points the same way. Graham and colleagues' trial of a text-message program for young adults who vaped was one of the first randomized trials of help to stop vaping, and it worked: 24.1% stopped, against 18.6% with assessment only[49]. The underlying problem is the same as with cigarettes, a nicotine dependence held in place by triggers, so the same principles apply: a set day, a complete stop, a plan for each trigger, and support. Because a vape is used more often and in more places, the trigger map is usually longer and the environment work matters more. Anyone thinking about nicotine replacement or a medicine to stop vaping should discuss it with a doctor or pharmacist, since the trial evidence for those in vaping is still thin.

Section 10

Why do people gain weight when they quit, and how much?

In brief

On average about 4 to 5 kg in the first year, most of it in the first three months. The spread is wide: some people lose weight and some gain more than 10 kg. In one trial, people who gained more weight were less likely to smoke again, not more.

People who stop smoking without help gain on average about 4 to 5 kg in the first year, and most of it comes in the first three months. Aubin and colleagues pooled 62 studies and found a mean gain of 1.12 kg at one month, 2.26 kg at two, 2.85 kg at three, 4.23 kg at six and 4.67 kg at twelve[52]. The spread was wide. At one year, 16% of people had lost weight, 37% had gained less than 5 kg, 34% had gained 5 to 10 kg and 13% had gained more than 10 kg. Hunger is one of the withdrawal symptoms that lasts longest, often for six months[41].

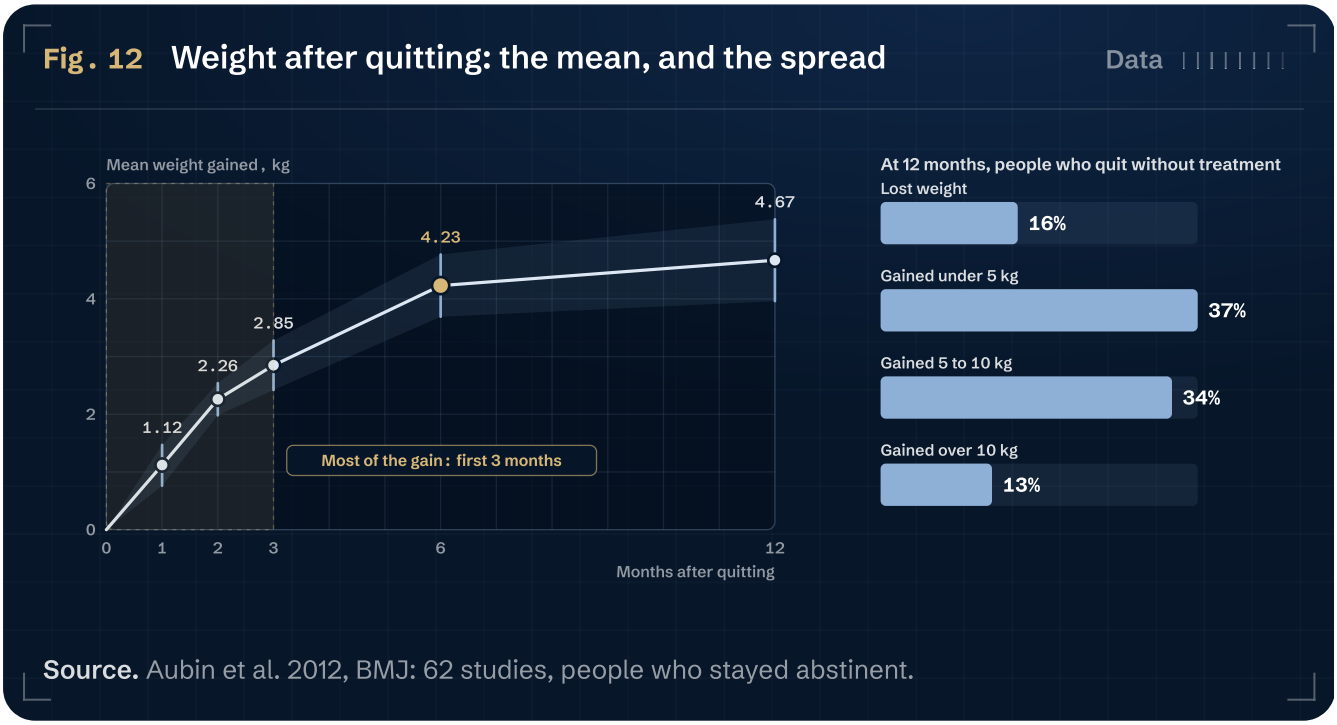


Figure 12. Mean weight gained by people who stopped smoking without treatment and stayed stopped, with 95% confidence intervals, from Aubin and colleagues' meta-analysis of 62 studies. Most of the gain comes in the first three months. The bars show how widely people differed at twelve months. Scrub the months to read the trace.

Hunger is part of the reason. In Hughes and colleagues' trial of 315 people stopping smoking, hunger was one of the main withdrawal symptoms and lasted for six months in many of them; nicotine gum reduced the hunger but did not stop the weight gain[41]. Food is also the most available replacement for the hand-to-mouth routine and the small reward of a cigarette, so eating tends to fill some of the moments smoking used to fill. Most of the gain comes in the first three months[52], which is the same period in which routines are being rebuilt.

Two findings make weight less of a reason to keep smoking than it seems. The first is that in Hughes's trial, people who gained more weight after stopping were less likely to relapse, not more[41]. Gaining weight did not drive people back to cigarettes. The second is that the health benefit of stopping is far larger than the cost of a few kilograms. In the Framingham data, heavy smokers who had stopped within the last five years already had a 39% lower risk of heart attack, stroke, heart failure or death from heart disease than heavy smokers who carried on[53]. Weight matters, and it is worth planning for. It is not a reason to keep smoking.

The practical answer is to put food, exercise and the hours smoking used to fill into the plan from the start, rather than dealing with weight after it has gone up. That is why the program works on nutrition and exercise in the two weeks before the stop date, and why replacing what smoking did is one of its later targets (Section 14).

Section 11

What works best to quit: medication, support or willpower?

In brief

A stop-smoking medicine or nicotine replacement plus behavioural support works best. Varenicline roughly doubles the chance of stopping, nicotine replacement raises it by about half, and counselling raises it further. Willpower alone works least well.

A stop-smoking medicine or nicotine replacement combined with behavioural support works best, and willpower alone works least well. Stead and colleagues reviewed 53 trials with more than 25,000 people and found that combining medication with behavioural support raised the chance of stopping by 83% compared with usual care, brief advice or lighter support[4]. Of the medicines, varenicline has the largest effect: it roughly doubles the chance of stopping compared with a placebo[10]. Nicotine replacement in any form raises it by about half[9], and using a patch together with a fast-acting form works better than one form alone[36]. Counselling adds to all of these[11].

Fig. 13 The evidence bench for stopping smoking

Data



Source. Hartmann-Boyce et al. 2018; Lindson et al. 2019; Livingstone-Banks et al. 2023; Lindson et al. 2025; Lancaster and Stead 2017; Stead et al. 2016; Ussher et al. 2019. All Cochrane Database of Systematic Reviews; abstinence at six months or more.

Figure 13. Pooled results from Cochrane reviews, on one logarithmic scale of risk ratios: how many more people stopped for six months or more with each aid than with what it was compared against. Each row names its comparison, because they differ. The gold diamond is the pooled estimate; the bar is its 95% confidence interval. Point at a row to read the size of the evidence and the certainty the review gave it.

11.1 Medicines and nicotine replacement

Nicotine replacement gives the body nicotine without the smoke, so withdrawal is softer while the routine is taken apart. Hartmann-Boyce and colleagues pooled 133 trials with 64,640 people and found high-quality evidence that every form of nicotine replacement helps people stop for six months or more, raising the chance by 55% overall[9]. Lindson and colleagues found that using a patch together with a fast-acting form such as gum, lozenge, spray or inhalator raised the chance by a further 25% compared with a single form, and that 4 mg gum worked better than 2 mg[36]. The patch keeps the background level steady; the fast-acting form deals with the spikes set off by triggers[35].

Varenicline works on the same alpha-4 beta-2 receptor, partly activating it and partly blocking nicotine from it, so smoking gives less reward and going without hurts less. Livingstone-Banks and colleagues pooled 41 trials with 17,395 people and found high-certainty evidence that it more than doubles the chance of stopping compared with placebo. Cytisine, an older medicine that works the

same way, also helps, and in head-to-head trials it was not clearly different from varenicline[10]. The EAGLES trial of 8,144 smokers, about half with a psychiatric diagnosis, found no significant rise in serious neuropsychiatric side effects with varenicline or bupropion compared with the patch or placebo[15]. These are prescribed medicines. Whether one suits a particular person, at what dose and for how long is for a doctor or pharmacist to decide.

11.2 Behavioural support

Behavioural support works on its own and adds to medicines. Lancaster and Stead pooled 27 trials and found that one-to-one counselling from a trained adviser raised the chance of stopping by 57% compared with brief advice, usual care or leaflets, by 24% even when both groups had nicotine replacement, and that more intensive counselling worked better than brief counselling[54]. Hartmann-Boyce and colleagues' network meta-analysis found high-certainty evidence that counselling of any kind helps, from 194 studies with 72,273 people, along with evidence of benefit from guaranteed financial incentives and, with moderate certainty, from support by text message[11]. The common thread is that someone is working with the person through the first weeks, and that the person has a plan for the moments that matter.

Planning for those moments has trial evidence of its own. Implementation intentions are plans that say exactly what a person will do when a particular situation comes up. Gollwitzer and Sheeran's meta-analysis found they had a medium-to-large effect on reaching goals, partly because they make the critical situation easier to notice and start the planned response with little thought when it arrives[55]. Armitage tested a version for smokers: 193 smokers were randomized to a sheet that helped them link each of their temptations to a planned response, or to control conditions. The planning group smoked fewer cigarettes, became less dependent and was more likely to quit[56].

11.3 Willpower, exercise and the rest

Willpower alone is the baseline that every other aid is measured against, and it is the weakest: 3 to 5% are still stopped six to twelve months after an unaided attempt[3]. Willpower is not useless; every successful stop needs a decision. It fails as a whole method because it asks deliberate control to win the same contest hundreds of times, at the moments when stress, tiredness and triggers have weakened it most[24, 25]. Quinn and colleagues found that the most effective way to control a strong habit in the moment was vigilant monitoring, watching for its signs and telling oneself not to, which works by strengthening inhibitory control[57]. That is a skill, and it can be trained before it is needed.

Some popular aids have weaker evidence than their reputation. Exercise is the clearest example. A single bout reliably cuts craving for up to 50 minutes[40], but the Cochrane review of exercise programs added to stop-smoking support found only low-certainty evidence and no clear effect on long-term abstinence: a risk ratio of 1.08, with a confidence interval that includes no effect[58]. We include exercise in the program for craving, mood, sleep and weight, and we do not claim it makes people stay stopped on its own.

This program is behavioural support. It is not a medicine and does not replace one. For anyone who can take a stop-smoking medicine or nicotine replacement, the evidence says to use it, and to use it alongside support. Our program is built to sit beside that, working on the parts medicines do not reach: the triggers, the routine, the stress and sleep that make the first weeks harder, and the months after the medicine has finished.

Section 12

What happens to your body when you quit smoking?

In brief

In the first weeks, withdrawal and the brain's receptors settle. Within five years, the risk of heart attack and stroke falls sharply. Over a lifetime, stopping gives back most of the ten years smoking takes, and the earlier the better: about ten years for people who stop by 30, and still about three for people who stop at 60.

When you quit smoking, the body starts to recover in stages. In the first weeks, withdrawal peaks and settles, and the brain's nicotine receptors return to a non-smoker's level by about six to twelve weeks[45]. Within five years, the risk of heart attack, stroke and heart failure falls sharply[53]. Over a lifetime, stopping gives back most of the years smoking takes. In a 50-year study of British doctors, men who kept smoking died about ten years earlier than men who never smoked; those who stopped at 30 gained back about ten years, at 40 about nine, at 50 about six and at 60 about three[59]. It is never too late for it to be worth it.



Figure 14. Each ruler is the ten years of life that men who kept smoking lost, in Doll and colleagues' 50-year study of 34,439 British doctors. The gold cells are the years men who stopped at each age gained back. Point at an age to read it. The figures are for men born between 1900 and 1930 who smoked cigarettes only; a large American study found very similar gains[60].

12.1 The heart and the long run

Two large studies from different countries and generations give almost the same numbers. Doll and colleagues followed 34,439 British male doctors from 1951 to 2001 and found that those who smoked throughout died on average about ten years younger than lifelong non-smokers[59]. Jha and colleagues studied 202,248 American adults interviewed between 1997 and 2004. Current smokers had about three times the death rate of people who had never smoked, and lost more than ten years of life expectancy. People who had stopped at 25 to 34, 35 to 44 and 45 to 54 gained back about ten, nine and six years, and stopping before 40 cut the excess risk of death from continued smoking by about 90%[60].

The heart recovers sooner than the long-run figures suggest. Duncan and colleagues used decades of Framingham Heart Study records to look at heavy smokers, people with at least 20 pack-years. Within five years of stopping, their risk of heart attack, stroke, heart failure or death from heart disease was 39% lower than in heavy smokers who carried on. Their risk stayed above that of people who had never smoked for longer, and was no longer clearly raised by about ten to fifteen years[53]. These are observational studies, and people who stop may differ from people who do not in other ways, but the size and consistency of the effect across studies is very large.

12.2 Mood, sleep and the rest of the day

The changes people notice first are in mood and the shape of the day. Anxiety, depression and stress end up lower than if they had kept smoking (Section 4)[14]. Sleep is broken for the first weeks and then has a chance to improve, since smokers sleep less deeply and wake more often than non-smokers[43]. The cycle of rising tension and relief that ran through every hour of the day is gone. So is the need to plan meetings, journeys and flights around the next cigarette, which many people only notice once it has stopped.

There is also a change in how the future is weighed. Bickel and colleagues asked current smokers, ex-smokers and never-smokers to choose between smaller amounts of money now and larger amounts later. Current smokers discounted the future more steeply: a reward later was worth less to them. Ex-smokers did not differ from never-smokers[61]. The study cannot say whether stopping changed the ex-smokers or whether people who discount less are the ones who manage to stop, and the authors raise both. Either way, the person who has stopped smoking tends to look like someone who weighs next year as well as the next ten minutes, which is the kind of person who stays stopped.

Section 13

What should I do if I smoke again?

In brief

Stop again straight away, before one cigarette turns into the old pattern. Work out exactly what set it off, change the plan for that trigger, and treat the cigarette as information about the plan rather than proof about yourself. How people explain a lapse to themselves predicts whether it becomes a relapse.

If you smoke again, stop again straight away, before one cigarette turns into the old pattern. Then work out exactly what set it off: where you were, who you were with, what you were feeling and what happened in the minutes before. Change the plan for that moment. And treat the cigarette as information about the plan, not proof that you can't do it. How people explain a cigarette to themselves after stopping predicts whether it becomes a full relapse[62].

The research on this is mostly from smokers. Curry, Marlatt and Gordon studied people who had smoked after stopping and compared those who went on to full relapse with those who smoked once and stopped again. The ones who relapsed put the cigarette down more to internal, stable and global

causes, such as a lasting personal weakness that would show up everywhere, than the ones who recovered[62]. “I smoked because I'm a smoker and I always will be” leads back to the pack. “I smoked because I was at the bar with Tom, I'd had three drinks and I had no plan for it” leads to a better plan.

The numbers in Section 7 make this urgent. Among people who quit on their own, one cigarette after the quit date was followed by a return to regular smoking 95% of the time[30]. Those people mostly had no plan for what to do after a cigarette, and many of them would have treated it as the end of the attempt. The single cigarette is the most dangerous moment in the whole process, not because of the nicotine in it, but because of what the person decides it means.

Witkiewitz and Marlatt describe relapse as a process rather than an event, in which stress, craving, confidence, coping and the meaning given to a lapse feed into one another over hours and days[63]. That is useful because a process can be interrupted at several points. Hendershot and colleagues' review of relapse prevention research describes coping responses prepared in advance as the core of what works[64]. In Shiffman's study of first lapses, people who used coping in a tempting moment were far more likely to get through it without smoking[33].

It also helps to remember how most people stop for good: after several attempts, each one teaching something about where the last one broke[8]. A cigarette at week five is not a return to day zero. The receptors have spent five weeks resetting, the person has five weeks of evidence that they can go without, and the triggers that remain are now better known than before. What usually goes wrong is not the cigarette. It is the conclusion drawn from it.

If you smoke again

Put it out and do not have another. Get rid of any cigarettes or vape you have. Within the day, write down where you were, who you were with, what you felt and what happened just before. Change the plan for that exact moment. Tell the person supporting you. Then carry on from where you are, not from the start.

Section 14

What does the Phalanx program target for someone quitting smoking or vaping, and when?

Days 31 to 90

In brief

Ninety days in three phases. The first month rebuilds sleep, stress, fitness and the shape of the day, and smoking or vaping stops on Day 15. The second month maps every trigger and builds a response for each. The third works on identity and the people and places that still tempt. Six months of aftercare follow. Stop-smoking medicines, where a doctor or pharmacist advises them, are used alongside it.

The Behavior Control System is the same 90-day program for every habit, applied to the loop beneath each person's smoking or vaping. Days 1 to 30 rebuild the ground the habit has been running on: sleep, the body clock, daylight, exercise, food, stress and a structured day. The client stops smoking or vaping on Day 15, after two weeks of that work. Days 31 to 60 work on the moment a cigarette or a vape actually happens: every trigger is mapped, the ones that can be removed are removed, and each one left gets a prepared, rehearsed response, including the thoughts that argue for one and the stress that most often sets it off. Days 61 to 90 work on identity and on the people, places and routines that still tempt the person back. Six months of aftercare follow. It asks for about thirty minutes of focused work a day: a short lesson each morning, a brief log each night, and a set of daily practices, which the program calls north stars, built into the routine the person already has.

The program is behavioural support. It does not prescribe or replace medicine. Anyone using nicotine replacement, varenicline, cytisine or another stop-smoking medicine on the advice of a doctor or pharmacist keeps to it exactly as directed, and where a prescriber sets the stop date or the timing of a medicine, their timing comes first. The evidence in Section 11 is that medicines and support work best together[4], and we would rather a client used both.

14.1 Before Day 1

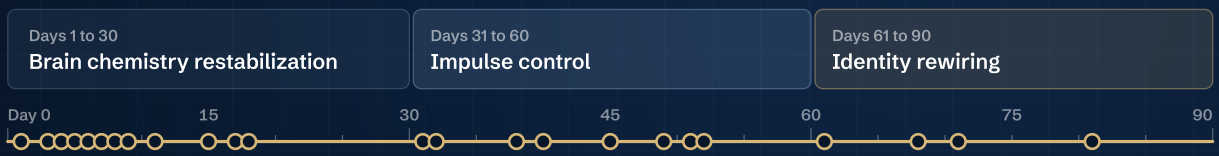
Every program starts with a Root-Cause Diagnostic: an application describing the habits involved and what has already been tried, followed by a thirty-minute, one-on-one conversation with our team. For nicotine it has two jobs. The first is safety and medicine: it asks about prescribed medicines, pregnancy and any history of depression, and tells the person to speak to their doctor or pharmacist where any of those apply (Section 2), and it asks whether they would like to use a stop-smoking medicine alongside the program. The second is to identify the loop beneath the habit: what the cigarette or vape does for the person, the earliest trigger in the day, the moments it is most tied to, why earlier attempts broke down and what is missing for change to hold. Two people who both smoke 20 a day rarely have the same loop. One smokes to break up a long day at a desk; another smokes only with a drink and the same three friends; a third vapes almost without noticing, from waking to sleep. The diagnostic reads the loop across the three areas the Addictions Neuroclinical Assessment proposes for this problem: the urge set off by triggers, negative emotion and executive function[65]. It is not a clinical assessment and takes no medical measurements.

A preparatory phase, Phase 0, follows before Day 1 and does not count toward the 90 days. It separates the decision to stop from the start. The client sets out in concrete terms the life they are building and what smoking has cost it, makes a commitment to someone who matters to them, chooses a start date that marks a real boundary in their life, and proves to themselves that they can hold one full day of control. The choice of start date rests on the fresh start effect: dates that mark a new beginning, such as the start of a week, a month or a meaningful anniversary, were followed by more people acting on their goals[66]. The day of control rests on Bandura's finding that succeeding at something directly is the most dependable source of belief that one can do it[67]. A commitment that is recorded and made to another person holds better than a private one[68]. Marcel R., who stopped weed, cigarettes and scrolling together, put his own start plainly: “I made the commitment. I wrote down my commitment.”

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Fig. 15 The 90 days for someone quitting smoking or vaping

Timeline



Homeostasis

Day 1 Nightly log and baseline begin
Self-monitoring

Day 3 Fixed sleep and wake times
Body clock and sleep

Day 4 Morning daylight and a daily walk
Body clock

Day 5 Evening light down; phone out of the bedroom
Sleep

Day 6 Progressive training and cardio
Craving, mood, weight

Day 7 Daily meditation
Attention to internal states

Day 8 Food and the gut
Appetite and weight

Day 9 A day built on fixed anchors
Habit control

Abstinence with systems

Day 31 Full trigger map
Trigger learning

Day 32 Cigarettes, vapes and easy access removed
Context and access

Day 38 Social situations planned
Situational control

Day 40 Permission thoughts
Cognitive control

Day 45 Stress and smoking again
Stress system

Day 49 Urge observation
The felt urge

Day 51 Now against later
Delay discounting

Day 52 A response for every trigger
Implementation intentions

Burn down the old subconscious and unconscious thinking models

Day 61 Identity work begins
Self-concept

Day 68 Smoking company and outside pressures
Social context

Day 71 Rehearsing high-risk moments
Mental rehearsal

Day 81 Replacing what smoking did
Habit control



Figure 15. The three phases of the program, with the days on which the targets that matter most for nicotine are introduced. Phase 0 comes before Day 1. Smoking or vaping stops on Day 15, after two weeks of groundwork, with any stop-smoking medicine used as its prescriber directs. Six months of aftercare follow Day 90. The exercises themselves are not published.

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Table 3. The day map for someone quitting smoking or vaping: what each stretch of the program targets, and the evidence behind the choice. Days refer to the program calendar. The table states the target only; the exercises themselves are not published.

Days	Target	Why it matters for quitting nicotine
Before Day 1	Root-Cause Diagnostic: the loop beneath the habit; medicines, pregnancy and mood history checked, with a referral to a doctor or pharmacist where needed	Smoking changes how some medicines are cleared[1]; the loop is read across trigger-set urges, negative emotion and executive function[65]
Before Day 1	Commitment, a meaningful start date, one day of control	Fresh starts and direct experience of success raise follow-through[66, 67]
1 to 2	How the loop works; the nightly log	Recorded monitoring of progress improves goal attainment[68]
3 to 5	Sleep and wake times, daylight, evening light, phone out of the bedroom	Sleep problems in withdrawal are linked to lower abstinence[43]
6	Progressive resistance training and cardio	A bout of exercise cuts craving for up to 50 minutes[40], though exercise programs alone have not been shown to keep people stopped[58]
7	Daily meditation	Groundwork for observing urges; urge surfing reduced smoking in college smokers[39]
8	Food and the gut, at a general level	Most weight gain after stopping comes in the first three months[52]
9	A day built on fixed anchors	Stable routines fill the moments in which habits run[22]
10 to 14	The loop, the case for stopping completely, the reward inventory, self-assessment	Stopping on one day beats cutting down[12]; one cigarette usually leads back[30]

Days	Target	Why it matters for quitting nicotine
15	Smoking or vaping stops; habits that travel together, such as coffee or a drink with a cigarette	Coffee, meals and other smokers are tied to smoking in daily life[31]
16 to 23	Heat and cold exposure, a demanding new pursuit, awareness training, breathing, practice days	Earned rewards compete with the drug; vigilant monitoring controls strong habits[57, 69]
24 to 30	Perspective, evidence of recovery, how triggers are learned	Nicotine receptors are back to normal by 6 to 12 weeks[45]; triggers alone raise craving[34]
31 to 32	Full trigger map; cigarettes, vapes, lighters and easy access removed	Changing the situation beats resisting an urge already under way[37]; personal smoking places raise craving[32]
33 to 39	Why the first weeks are hard, the response sequence, social situations, breaking the routine	Most withdrawal symptoms last 2 to 4 weeks; craving lasts longer[2, 41]
40 to 43	Permission thoughts	Pushing a thought away makes it return[70]
44 to 51	Emotion, stress, breathing, relaxation, urge observation, an earned reward, now against later	Bad moods set apart first lapses[33]; smokers discount the future more steeply than ex-smokers[61]
52 to 60	A response for every trigger; daily practice and a craving record	Linking each temptation to a planned response helped smokers quit in a randomized trial[56]
61 to 70	Identity, smoking company, outside pressures, limiting beliefs	Stopping spreads through spouses, friends and co-workers[38]
71 to 80	Rehearsal of high-risk moments: the first drink out, the hard day, the smoking break	Mental practice improves performance[71]
81 to 90	Replacing each function smoking served; review of the 90 days	A new routine takes weeks to months to become automatic[72]

Days	Target	Why it matters for quitting nicotine
After 90	Self-forgiveness, identity reinforcement, six months of aftercare	How a lapse is explained predicts whether it becomes a relapse[62]

14.2 Why the order matters for nicotine

The order follows from the research in Sections 2 to 13. Smoking or vaping stops after sleep, exercise, food and stress have had two weeks of work, because low mood and poor sleep in withdrawal are linked to lower abstinence[42, 43], and because the hours and moments the cigarette used to fill need something in them on the first day without it. Stopping is complete rather than gradual, because the trial evidence favours it[12]. The trigger work comes in the second month, after the hardest week, when most withdrawal symptoms are easing but craving set off by triggers is still the main cause of relapse[2, 35]. Identity and social context come last, because they change slowest and because a new self-description needs weeks of evidence behind it to be believed.

In the program · Phase 2, Impulse control **Days 31 to 32**

The trigger map and the environment

The client maps every situation in which they smoked or vaped, from the first cigarette of the day to the last, and removes what can be removed: cigarettes, vapes, lighters, the ashtray by the back door, the route past the shop. Each trigger that cannot be removed is listed for a response in the weeks that follow.

The environment comes before the responses because changing a situation before an urge begins is more effective than resisting one already under way[37]. For smokers it has an extra reason: a personal smoking place raises craving by itself[32], and first cigarettes after stopping were more likely where cigarettes were easy to get[33]. Verplanken and Wood describe how a change in the context where a habit runs disrupts its automatic start and opens a window in which a new behaviour is easier to establish[73]. A smoker who changes where they take their break, what they do after a meal and how they drive to work is not relying on resolve at those moments.

In the program · Phase 2, Impulse control **Days 40 to 43**

Permission thoughts

The client identifies the thoughts that argue for one cigarette or one vape, such as “just one won't hurt”, “I've earned it” or “I'll stop again tomorrow”, and learns to recognise them as part of the habit rather than as conclusions.

Permission thoughts get their own days because they are what turns a craving into a decision. Trying to push them away tends to backfire. Wegner and colleagues showed that people told not to think about something thought about it more, especially once they stopped trying[70]. The work is to notice the thought as a thought and see where it leads, which Shiffman's finding supports: coping done in the head was what made the difference in tempting moments[33].

In the program · Phase 2, Impulse control **Days 52 to 60**

A response for every trigger

Each trigger on the map gets a specific, planned response for the moment it arrives, practised daily, with a record of every craving and what was done about it.

This is the part with the most direct trial support for smokers. Armitage randomized 193 smokers and found that those helped to link each of their own temptations to a planned response smoked less, became less dependent and were more likely to quit than those in three control conditions[56]. The broader meta-analysis of plans of this kind found a medium-to-large effect on reaching goals[55]. The record of cravings also shows the client something that is hard to see from inside one bad afternoon: that cravings come, peak and pass, and that their number and strength change over weeks. The relapse curve flattens as time without nicotine builds up[46].

In the program · Phase 3, Identity rewiring **Days 81 to 90**

Replacing what smoking did

The client confirms a replacement for each function the cigarette or vape used to serve: the break in a long day, the pause after a meal, the way they handled pressure, the time with particular people. They review the full 90 days against their log and record what they have gained.

Replacement comes last because a habit that served a function leaves a gap when it stops, and a gap left empty tends to be filled by whatever is closest to hand, which for many people stopping smoking is food or a vape. A replacement put in the same place and at the same time as the old cigarette can take over its context[22]. Lally and colleagues found that a new daily behaviour became automatic gradually, reaching most of its peak after a median of 66 days with wide variation between people, and that missing a single occasion did not materially affect the process[72]. By Day 90 the replacement has been in place long enough to begin running on its own.

14.3 Identity and the people around the habit

The third month works on two things that hold smoking in place long after the nicotine has gone. One is identity. Oyserman's identity-based motivation model holds that people act in ways that feel consistent with the identities active for them in the moment, and read difficulty according to whether a goal feels like one that people like them pursue[74]. Someone who still thinks of themselves

as a smoker who isn't smoking is in a different position from someone who no longer smokes. The other is social context. Stopping spreads through spouses, friends and co-workers[38], and the people who smoke around the client, the work breaks, the evenings out and the friend who always offers one are all planned for. Mental rehearsal of the highest-risk moments follows, because practising a response in the mind improves performance when the moment comes[71].

14.4 In our clients' words

Two of our clients who came to us with nicotine among their habits have described their experience on the record. Marcel R., a commercial director in the Netherlands, had smoked weed and cigarettes and scrolled his phone for about 15 years and had tried seriously to stop at least ten times. What wore him down most was the fight itself: “These three things had a huge influence on my life. Not specifically the act of doing it, but the struggle I was going through for years and years and years trying to quit these bad habits.” When he recorded his interview, he had gone four months without any of them, and he said: “I’m totally done with all three of these bad habits. I haven’t been doing them, not a single time. It’s out of my system.” Adam, a crypto investor and founder in Vietnam, came to us with nicotine, junk food and social media. Of where he is now, he said: “I exercise every day like hell, and I am living my best life ever.” Their words are shared with consent. They are two people's experiences, not evidence of what will happen for anyone else.

What this paper does not publish

This paper states what each part of the program targets for someone quitting smoking or vaping, on which days and why, with the evidence for each choice. It does not publish the exercises, their steps, scripts, worksheets or wording. A reader can evaluate the reasoning from this paper, but cannot reproduce the program from it.

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Section 15

What do our results show, and what can't this paper tell you?

In brief

We report a 97% success rate, meaning clients who ran the program and stayed off the habit through the program and six months of aftercare. It comes from our own client follow-up, not from a controlled trial, and covers all habits. Smoking has far stronger trial evidence for medicines and counselling than exists for our method.

Phalanx Labs has worked with 290+ clients across 12 countries over 7 years. Of those clients, 98.4% had already tried and failed to stop before they came to us. Our success rate is 97%, defined as the share of clients who ran the program and stayed off the habit through the program and the six months of aftercare that follow it. That rate covers all of our clients and all of the habits they came with. We don't publish a separate rate for smoking or vaping. Because the definition matters as much as the number, we set out below what each figure counts, how it is known and what it does not establish.

Table 4. The figures we report, what each one counts and how it is known. All figures are drawn from our own client records and cover every habit we work with, not nicotine alone.

Figure	What it counts	How it is known
290+ clients	People who have worked with Phalanx Labs over 7 years	Client records
12 countries	Countries in which those clients lived while working with us	Client records
98.4%	Share of clients who had already tried and failed to stop before they came to us	What clients reported about their history in their application and the diagnostic
97% success rate	Clients who ran the program and stayed off the habit through the program plus 6 months of aftercare	Client follow-up across the program and the six months of aftercare

15.1 How outcomes are tracked

Throughout the program, the client keeps a nightly log and completes a weekly progress update. These are written records of what happened, what was difficult and what was handled; they are not scored instruments. At the end of each of the first two phases the client has a progress call with our

team, the first around Day 28 and the second after Day 60. During aftercare we follow up with clients on whether they have stayed off the habit. A client counts as a success when they have run the program and stayed off the habit through the program and the full six months of aftercare.

15.2 What our figures do not show

- Self-report. Whether a client has stayed off cigarettes or vapes is known from what the client tells us, not from a breath, saliva or urine test of the kind smoking trials use to confirm abstinence.
- Selection. Clients choose to apply, are accepted after a diagnostic in which we decline people we can't help, and are counted only if they ran the program. People who decide to work with us may differ in motivation or circumstance from people who don't.
- No comparison group. We can't say how many of the same people would have stopped through another route, such as medication, a stop-smoking service or counselling, over the same period.
- Time window. The success rate covers the program and six months of aftercare. It does not describe what happens after that, and the relapse research in Section 7 shows that some risk continues beyond it.
- All habits together. The rate is across every habit our clients bring. We don't report a rate for nicotine alone, and a single rate does not predict the outcome for any one person.

15.3 What the research in this paper does not show

The studies cited here have their own limits. The brain imaging studies were small: 11 smokers in the receptor occupancy study, 13 and 10 in the study of nicotine arriving in the brain, and 19 in the study that followed receptors over three months[5, 17, 45]. The studies of mood after quitting, of weight and of life expectancy were observational, so people who stopped may have differed from people who did not in ways the studies could not fully measure[14, 52, 59]. Some of the strongest findings about triggers and lapses come from heavy smokers in the United States in the 1990s and 2000s[31, 33], and the research on vaping is young, with little yet on how best to stop[49]. Some of the shapes in our figures are schematic, and we have said so on each one.

Smoking also has a deeper body of randomized trials than almost any other habit people try to break. Nicotine replacement, varenicline, cytisine, nicotine e-cigarettes and individual counselling each have trial evidence from thousands of people, much of it rated high certainty[9, 10, 50, 54]. Our method has not been tested in a randomized or controlled trial, its outcomes have not been assessed independently, and it has not been published in a peer-reviewed journal. The research supports the reasoning behind each element. It does not show that the combination works, or how much each element adds to a medicine. The figures in Table 4 are our evidence for the combination, with the

limits stated above. A controlled evaluation would need independent outcome assessment with biochemical confirmation, a comparison condition and follow-up beyond six months. We would welcome one.

The definition, stated once more

97% success rate: clients who ran the program and stayed off the habit through the program plus 6 months of aftercare. Tracked through client follow-up, across all habits. Not a clinical trial, with no randomization and no control group.

Section 16

When should you see a doctor, and what is this program not?

In brief

See a doctor or pharmacist before you stop if you take a prescribed medicine, are pregnant, or have had depression, and to ask about a stop-smoking medicine. The program is not therapy, clinical care or medical treatment, and it does not replace medication a doctor prescribes.

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See a doctor or pharmacist before you stop smoking if you take any prescribed medicine, because smoking speeds up how fast some drugs are cleared and the dose may need checking once you stop[1]. See one too if you are pregnant, if you have a history of depression or another mental health condition, or if you have a heart or lung condition. And see one to ask about a stop-smoking medicine or nicotine replacement, because those raise the chance of stopping for good and work best with support[4]. If your mood drops badly in the weeks after stopping, or you have thoughts of harming yourself, contact a doctor straight away, or emergency services if you are in danger.

Medical safety note

Nicotine withdrawal is not dangerous, but stopping smoking can change how some prescribed medicines work. Anyone taking a prescribed medicine, anyone who is pregnant, and anyone with a history of depression talks to a doctor or pharmacist before stopping. Anyone using a stop-smoking medicine keeps to it as prescribed. This program does not replace it.

Phalanx Labs is a behavior and performance engineering firm. The Behavior Control System is a structured method for changing behavior. It is not therapy, clinical care or medical treatment, and it does not diagnose or treat any medical or psychiatric condition. Our team does not act as the client's doctor or therapist, and the program does not replace either. It does not prescribe, recommend or replace medication, including nicotine replacement and stop-smoking medicines. Where the diagnostic raises a medical question, we tell the person to see a doctor or pharmacist before they begin.

Some of the program's physical practices carry ordinary risks of their own. Cold and heat exposure and starting a training program are not suitable for everyone, and people with heart conditions, high blood pressure or other medical conditions should check with their doctor first. The program gives general information about supplements and tells clients to consult a doctor before taking any; it does not prescribe or recommend medication or supplements.

The program is also not designed for every situation. It is not a crisis service. It is not suitable as the only support for someone with a serious mental health condition, or someone at risk of harming themselves or others. The diagnostic exists partly to identify these situations, and when we can't help, we say so and suggest the person seek appropriate care.

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