

E-cigarettes, smoking initiation and smoking cessation

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Declaration of interest

- I have no links with any tobacco or e-cigarette manufacturers
- My research into safety and effects of EC has been funded by the National Institute of Health Research, Public Health England, UK Centre for Tobacco and Alcohol Studies, Cancer Research UK and UK Medicines Regulatory Agency

Contents

- Outline the key issues
- Review new data from past 12 months

The Key Question initially was: Do EC promote or reduce smoking?

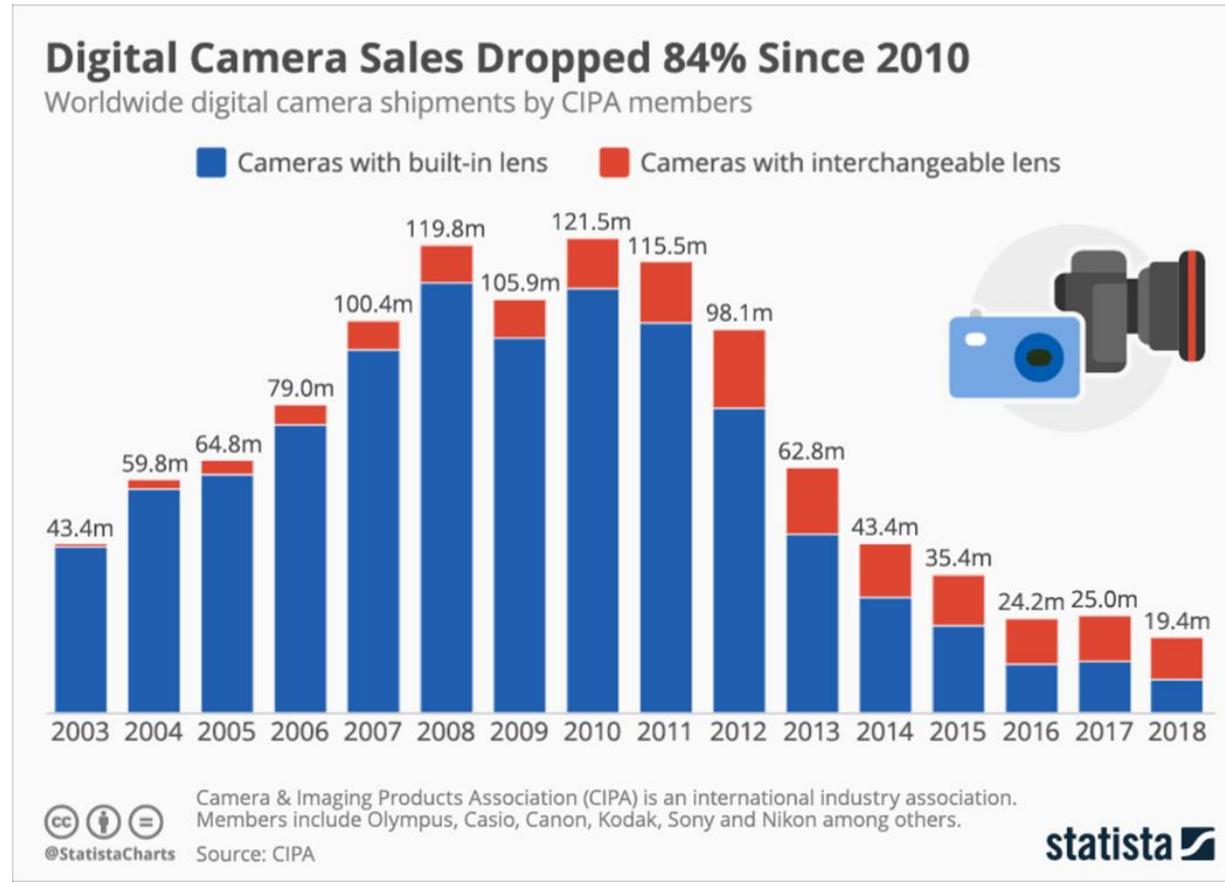
- The original objection to vaping and the stated reason for the backlash against it was that it promotes smoking
- The objection now is that it promotes nicotine use (rather than smoking). Irrational, but assertions about 'damage to developing brain' provide moral traction
- Effects of vaping on smoking are the key determinant of EC effects on public health

Moralists fought coffee

- Director of FDA forerunner USBC Wiley called for ban on Coca-Cola because of caffeine in it:
“Use of Coca-Cola led to wild parties and sexual indiscretions by coeds and induced boys to masturbatory wakefulness.”
- King Gustav III of Sweden (1746-1792) was more scientific: Convicted murderer to drink coffee daily to see if it is poisonous. Another drank tea, as a control. Two doctors oversaw the experiment. Both died and Gustav was murdered before either prisoner succumbed. The tea drinker died before the coffee drinker, aged 83.

New products do not promote their competitors

- Digital cameras killed film, now phone cameras are replacing them in turn



Some possible mechanisms

- Note the effect would have to be stronger than the product replacement effect
- Stopping smokers from quitting:
 - Smokers who would quit get somehow distracted by EC and carry on - ???
 - EC help smokers over bans that would otherwise force them to quit - ???
- Promoting initiation: If EC remain inferior to cigs or get banned, vapers may switch

Data suggesting EC use reduces quitting

- Smokers who failed quitting with EC followed up: They sometimes do poorly. (NRT users too, normally not reported) *
- Only EC/NRT users no good at quitting remain (quitters left the sample)

* Kalkhoran and Glantz, Lancet Resp 2016

Data suggesting EC use increases initiation of smoking

- Compared to youth who do not do such things, those who try EC are more likely to try cigarettes (and the other way round); and those who smoke regularly are more likely to have tried vaping *
- If vaping leads to smoking, smoking rates should increase
- If due to common liability, vaping should deflect nicotine seekers, smoking decreases

* Chafee, Watkins, Glantz 2018, Pediatrics

Where to find clean data

- Do EC help or hinder quitting smoking?
RCTs (eventually epidemiology)
- Do EC promote or reduce smoking initiation?
Epidemiology (vaping and smoking in youth)

Some new data
2018-2019

Does vaping lure young non-smokers to smoking?

It does not lure them even to vaping

- ITC*: Non-smoking adolescents vaping on at least 15 days in the past month (daily vaping is even rarer)
- 2018: Canada: 0.6%; UK: 0.1%, USA 1.5%
- For USA, NYTS (bigger sample) gives 0.6%
 - In addition, **about half vape marijuana, not nicotine**
- NSDUH 2017, 12-17 year olds: **Smoking** in past month: 3.2%; smoking daily: **0.4% !**

* Hammond et al. 2019, BMJ

Survey in two high schools in Boston, 2019

- N=1,600 (14-18 year olds)
 - Response rate only about 40%
- 7% use nicotine daily, **1% smoke daily**
- Past daily smokers: 56% now vape daily
- Past daily vapers: 9% now smoke daily
- EC are more often a gateway away from than into smoking
- Daily smoking is virtually gone

Data from England/GB 2018/2019

NHS Digital (Annual Population Survey, N=320,000)

- England: Smoking prevalence: 14.4%
- **The fastest decline in younger groups**

2019 ASH YouGov Smokefree youth GB survey

- Pupils ever tried EC: 15% (16.0% in 2018), 2% >1/week
- **6% of never smokers tried EC; 0.1% vape >weekly, none daily !**

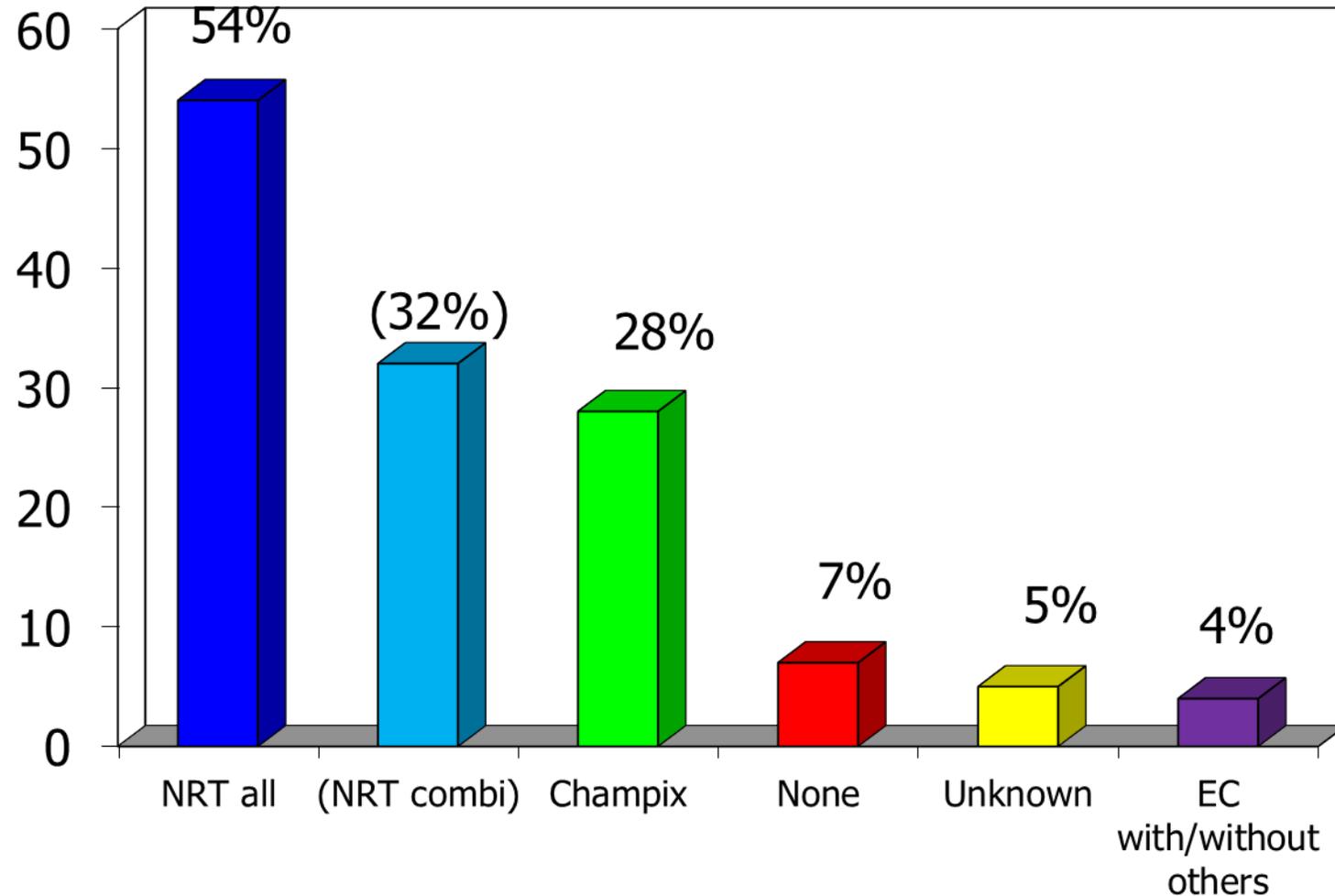
Does vaping help
smokers quit?

TEC trial

- Funded by  National Institute for Health Research
- *Co-authors*
- Anna Phillips-Waller, Dunja Przulj, Francesca Pesola, Katie Myers Smith, Natalie Bisal, Jinshuo Li, Steve Parrott, Peter Sasieni, Lynne Dawkins, Louise Ross, Maciej Goniewicz, Qi Wu, Hayden McRobbie

Hajek et al. 2019, NEJM

NRT Comparator: The most popular SSS treatment. Medications 2017-2018 (%)



NRT products



Gum



Patch



Nasal Spray



Inhalator



Lozenge



Microtab/Minis



Mouth Spray



Mouth Strip

NRT

- 88% used combinations (typically patch + faster acting product)
- Free to switch NRT products - 59% switched
- Supplies for three months
- Cost to NHS: £120 for 3M of one product

E-cigarettes

- Starter pack 'One Kit' (with adapter, spare battery, 5 atomisers), 30ml bottle of tobacco flavour e-liquid (18mg/ml nicotine)
- Second bottle if requested (only 7% did)
- 75% switched to other flavours
- **Cost: £30.25**



Early effects

- Adherence was initially good in both study arms, but EC were used for longer
- EC arm abstainers had less withdrawal discomfort and craving
- EC received more favourable ratings

**So how does this translate to
abstinence?**

Effects on abstinence and reduction at 1 year

	EC (N=438)	NRT (N=446)	RR (95% CI)
% abstinent* for 52 weeks	18.1%	9.9%	1.83 (1.30 to 2.58)
CO validated reduction in non- abstainers	12.8%	7.4%	1.75 (1.12 to 2.72)

*biochemically validated

Some 52-weeks abstainers used non-allocated products

- 2.5% in the EC arm were using NRT
- 20.5% in the NRT arm were using EC
- When these were removed from the sample, 52-weeks abstinence rates were

17.7% vs. 8%
(RR=2.21, 95%CI 1.52 to 3.22)

High on-going EC use in abstainers

- 9% in NRT arm still on NRT, 56% in EC arm on nicotine EC and another 24% on nicotine free EC
- Bad if it poses health risks later on
- Good if it prevents relapse (as long-term NRT use), discomfort and weight gain, maintains smoking rewards

Possible reasons for EC superiority

- Better at withdrawal relief and subjective effects, but also probably in nicotine tailoring
- Smokers determine nicotine intake when smoking. When on NRT (known to under-dose by some 50%), labelling dictates how much they are permitted to get. EC allows self-titration

EC products also allowed other tailoring

<i>Flavours used</i>	<i>52 weeks (N=511)</i>
Fruit	33%
Tobacco	25%
Menthol/Mint	16%
Chocolate, dessert, sweet or candy	14%
Other	12%

Conclusions for practice

- EC generate higher quit rates than NRT
- They achieve this at much lower cost
- EC starter packs should become one of SSS treatment options

EC vs usual care (RCT)

- Dental patients, N=80
- Refillable starter pack EC with no further support vs usual care
- 6M CO-validated quit rates
15% vs 5%, p<0.01

EC added to patch

- N=1,124
- Patches vs patches+nicotine-free EC vs patches+nicotine EC
 - Quitline support
- Validated abstinence at 6M
2%, 4% and 7%

Walker et al. Lancet Respiratory Medicine, 2019

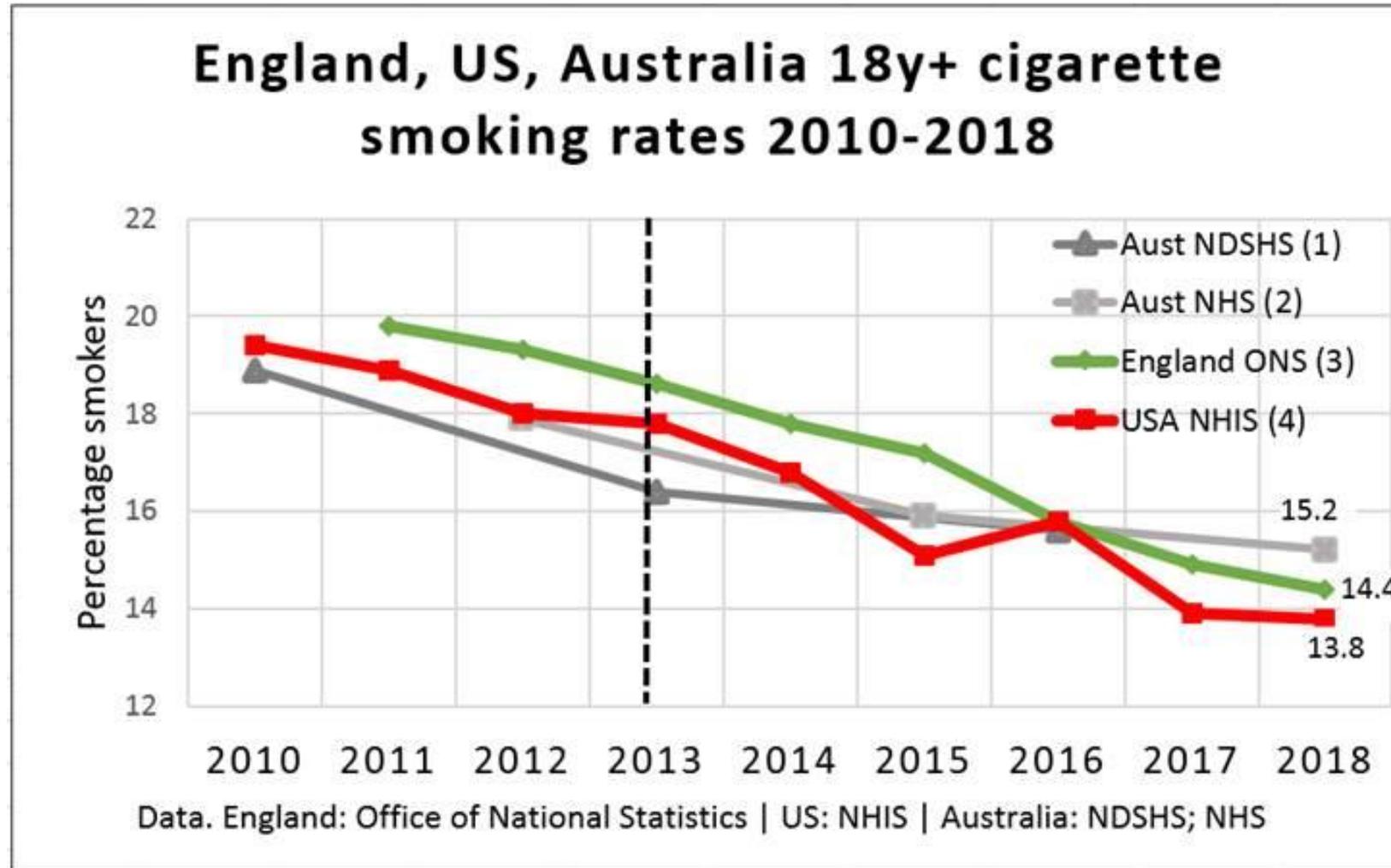
EC effects in general population

- N=18,929 who tried to quit in previous 12 months (STS surveys)
- Those using EC and those using varenicline had higher abstinence rates than the rest (OR=1.95 and OR=1.82, respectively)

Effect of EC use on population level smoking cessation

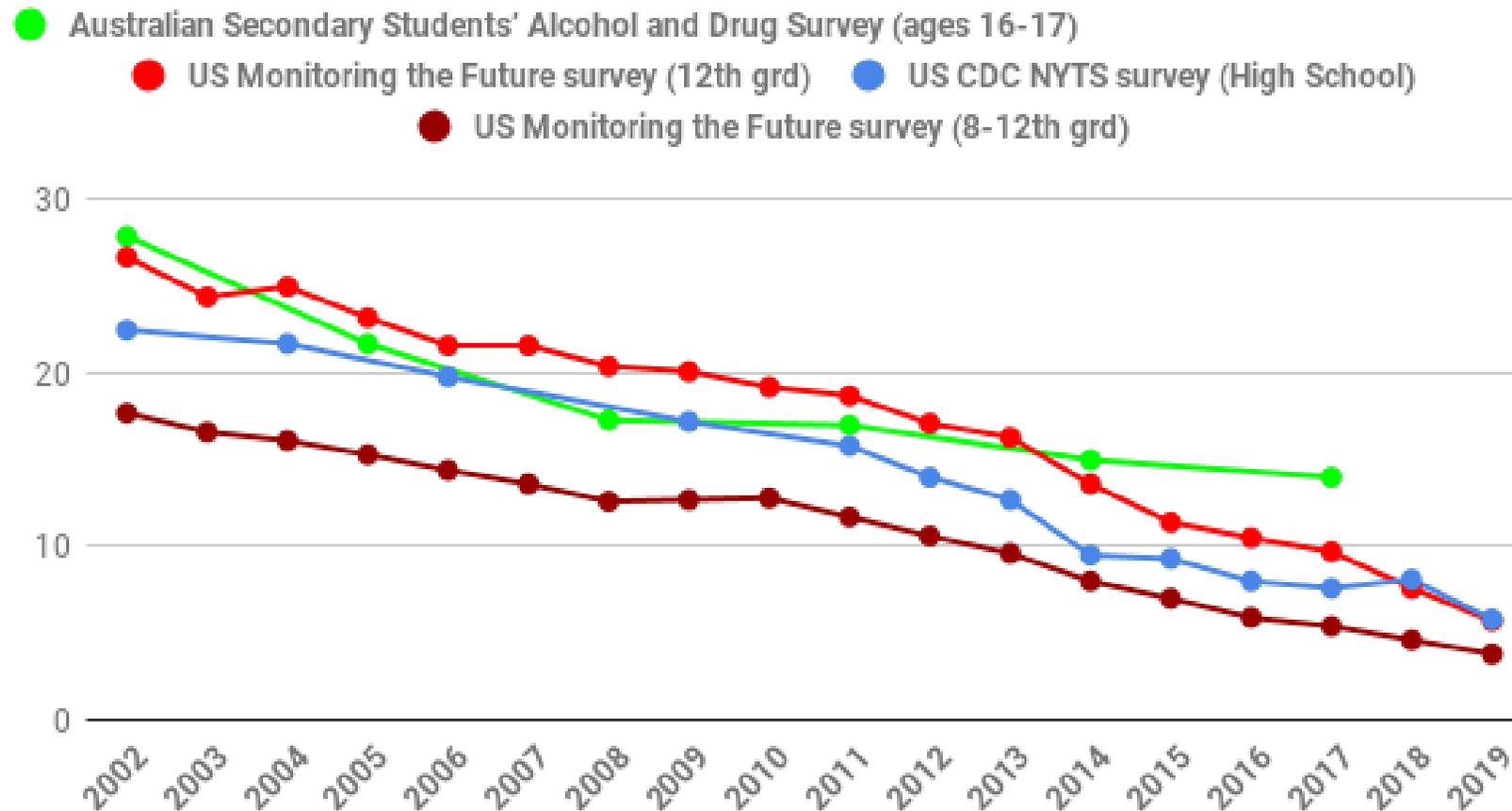
- US population survey (CPS-TUS)
- 2014-2015 (N=161,054); compared with previous 4 surveys
- Tried to quit? Quit for at least 3M?
- EC users quit rate: 8.2%; non-users: 2.5%-4.8%
- Population quit rate significantly increased

Another year of the natural experiment



Smoking in US youth (see 'vaping epidemic' alarm)

US vs AUSTRALIA PAST 30 DAY TEEN SMOKING TRENDS



Balance of evidence after the new crop of data

- Three new RCTs show that when provided proactively, EC are effective in helping smokers quit.
- Population data continue to suggest that EC help smokers in quitting outside clinical settings as well and that they do not promote and are probably reducing smoking initiation