



Short Communication

Gender differences in satisfaction ratings for nicotine electronic cigarettes by first-time users

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HIGHLIGHTS

- New Zealand smokers ($N = 357$) tried a nicotine e-cigarette (NEC) for the first time
- NECs were rated 83% as highly as own-brand tobacco for liking and satisfaction
- Females rated NECs more highly than males
- Positive NEC ratings predicted later reductions in smoking after a tax increase
- NECs may be a good option for nicotine replacement therapy with female smokers

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ABSTRACT

Introduction: Nicotine electronic cigarettes (NECs) are becoming increasingly popular as a potentially safer alternative to tobacco but little is known regarding their subjective effects, including possible gender differences. **Method:** Participants were New Zealand smokers with no intention to quit ($N = 357$) and whom had never used an NEC. During an interview in November–December 2012, participants sampled an NEC and rated it and their own-brand tobacco for satisfaction on a 10-point visual analogue scale. Participants were contacted again in February–March 2013 after a 10% increase in the tobacco excise tax on 1 January 2013.

Results: Overall participants rated NECs 83.3% as satisfying as own-brand tobacco. Females rated NECs more highly than males. Of those who agreed to be re-interviewed ($n = 227$), 37.8% said they had cut back or made a change in their smoking habit and 7% had quit in February–March 2013. NEC satisfaction ratings predicted changes in smoking habit and reductions in nicotine dependence after controlling for covariates including demographic variables, factory-made vs. roll-your-own tobacco preference, and addiction scores.

Conclusion: Smokers' first impressions of NECs were very favourable, and were correlated with readiness to change after a tobacco tax increase. NECs appear to be particularly attractive for female smokers, and their use may help to improve the efficacy of nicotine replacement therapy for women.

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1. Introduction

Nicotine electronic cigarettes (NECs) were first marketed in 2004 in China and have become increasingly popular worldwide (Adkison et al., 2013; Dockrell, Morrison, Bauld, & McNeill, 2013; Pearson, Richardson, Niaura, Vallone, & Abrams, 2012). NECs have been proposed as a safer alternative for smokers and an option for nicotine replacement therapy (NRT) because they function similarly to tobacco cigarettes from the user's perspective (Wagener, Siegel, & Borrelli, 2012), although concerns have been raised about their potential harm and liability for abuse, particularly with young persons (Cobb & Abrams, 2011). A recent

systematic review found limited research on NECs, with particular needs for studies on liability for abuse, topography of 'real world' use, and subjective effects (Evans & Hoffman, 2014).

There is currently little information about gender differences related to NECs. In an international survey of users from English and French websites ($N = 3587$), Etter and Bullen (2011) found that 61% were male, but no other gender differences were reported. Dawkins, Turner, Roberts, and Soar (2013) conducted an international survey of visitors ($N = 1347$) to websites of two firms that market ECs internationally. The majority (70%) of their respondents were male, similar to Etter and Bullen (2011). Although Dawkins et al. (2013) reported no significant gender differences in reasons for use, and effects on tobacco consumption or craving, they found that females tended to prefer sweet flavours (e.g., chocolate) and endorse statements related to subjective

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liking of NECs ('liked the e-cigarette because it looks and feels like a cigarette').

To our knowledge, only one study has compared the responses of males and females after sampling an NEC. Dawkins, Turner, Hasna, and Soar (2012) randomly assigned smokers ($N = 86$) to three groups: 1) NEC with 18 mg/mL nicotine (active); 2) NEC with 0 mg/mL nicotine (placebo); and 3) controls that could just hold the NEC. The active and placebo groups were allowed ad lib puffing for 5 min. They found that the active and placebo groups reported significantly less craving after 20 min than controls. Males in the active group reported significantly less craving after 20 min compared with the placebo group, whereas for females the difference between active and placebo groups was not significant. These results suggest that the nicotine content was more important for the male smokers.

A gender difference in the subjective effects and evaluation of NECs may have important implications for their use in NRT. Research has consistently demonstrated that males achieve higher quitting rates with NRT than females (Cepeda-Benito, Reynoso, & Erath, 2004; Wetter et al., 1999), with the most recent meta-analysis estimating the odds ratio for quitting at 1.60 for females versus 2.20 for males (Perkins & Scott, 2008). Given evidence that nicotine may be more reinforcing for males and that non-nicotine-related stimuli are more important for females in maintenance of smoking (Perkins, Donny, & Caggiula, 1999), an implication is that NECs may be particularly useful for NRT with females.

We interviewed a sample of New Zealand smokers ($N = 357$) in November–December 2012. After participants had sampled an NEC, we asked them to rate it as well as their own-brand tobacco for satisfaction and liking. Although electronic cigarettes are legal for sale in New Zealand, NECs are not (nicotine-containing liquid is only available by import), and none of our sample had previously used one. Based on Dawkins et al. (2013), we predicted that females would rate NECs more favourably. We contacted the sample again three months later after there had been a 10% increase in the tobacco excise tax. Decreases in smoking habit after the tax increase have been reported by Grace, Kivell, and Laugesen (2014a). As a secondary question, we asked if satisfaction ratings might predict changes in smoking habit. We anticipated that smokers who had higher satisfaction ratings for NECs would be more likely to decrease their smoking after the tax rise.

2. Method

2.1. Participants

Adult smokers ($N = 357$) were recruited by newspaper, community and internet advertising from four major NZ cities: Auckland ($n = 72$), Wellington ($n = 151$), Christchurch ($n = 71$), and Dunedin ($n = 63$). Participants needed to be daily smokers, over 18 years old, who purchased their own tobacco and with no intention to quit prior to 1 January 2013. Excluded were current or past users of e-cigarettes, current use of antismoking medication or non-cigarette tobacco, and pregnant/breastfeeding women. All were interviewed in November–December 2012 (Wave 1). The sample was contacted and re-interviewed in February–March 2013 (Wave 2). All received a NZ\$15 shopping voucher and a chance to win a NZ\$250 tablet computer for each interview.

The study was approved by the University of Canterbury Human Ethics Committee, and participants provided written consent.

2.2. Procedure

Participants were given a paper-and-pencil questionnaire, which asked about demographics and type of cigarettes smoked (factory-made or roll-your-own tobacco). They completed several addiction questionnaires, including: Fagerstrom Test of Nicotine Dependence (FTND; Heatherton, Kozlowski, Frecker, & Fagerstrom, 1991), Autonomy Over Smoking Scale (AUTOS; DiFranza, Wellman, Ursprung, &

Table 1
Demographic and cigarette preference data.

<i>Gender</i>	
Male	46.6% ($n = 162$)
Female	53.4% ($n = 186$)
<i>Cigarette preference</i>	
Factory-made (FM)	68.3% ($n = 244$)
Roll-your-own (RYO)	31.7% ($n = 113$)
<i>Ethnicity</i>	
NZ European	63.3% ($n = 219$)
Asian/other	6.6% ($n = 23$)
Māori/Pacific Islands	30.0% ($n = 104$)
<i>Age</i>	
18–24	23.0% ($n = 79$)
25–34	30.2% ($n = 104$)
35–44	17.2% ($n = 59$)
45–54	18.0% ($n = 62$)
55+	11.6% ($n = 40$)
<i>Education</i>	
No school qualifications	19.6% ($n = 66$)
5th Form School certificate (level 1 NCEA)	9.5% ($n = 32$)
6th Form School certificate (level 2 NCEA)	8.6% ($n = 29$)
University entrance (level 3 NCEA)	9.8% ($n = 33$)
Post-secondary qualification	27.6% ($n = 93$)
Undergraduate university degree	10.7% ($n = 36$)
Postgraduate university degree	14.2% ($n = 48$)
<i>Employment status</i>	
Student	16.8% ($n = 55$)
Unemployed	22.9% ($n = 75$)
Employed	60.4% ($n = 198$)
<i>Income</i>	
<NZ\$20,000	25.6% ($n = 99$)
NZ\$20,000 ≤ x < NZ\$30,000	12.4% ($n = 48$)
NZ\$30,000 ≤ x < NZ\$40,000	8.5% ($n = 33$)
NZ\$40,000 ≤ x < NZ\$50,000	8.5% ($n = 33$)
NZ\$50,000 ≤ x < NZ\$60,000	9.6% ($n = 37$)
NZ\$60,000 ≤ x < NZ\$70,000	7.0% ($n = 27$)
≥NZ\$70,000	18.1% ($n = 70$)

Sabiston, 2009), and the Glover–Nilsson Smoking Behavior Questionnaire (GNSBQ; Glover et al., 2005). For more information on these questionnaires see Grace, Kivell, and Laugesen (2014b). Participants were given the opportunity to sample an NEC. The experimenter explained how the NEC (Safe Cigarette brand) produced a vapour containing nicotine when inhaled and could be puffed similarly to a regular cigarette. The NEC had tobacco extract flavour (no actual tobacco) and was listed as 18 mg/mL nicotine content. On analysis, the Safe Cigarette yielded 13.95 mg/mL nicotine, and 200 hand-drawn puffs at 20 mg of nicotine per puff. After taking several puffs on the NEC, participants were asked to rate both their regular cigarette and the NEC for liking and satisfaction on a single-item 10-point Likert scale (1 = don't like at all; 10 = like very much).

Table 2

Correlations between demographic variables (income, age, education level), nicotine dependence and addiction scores (FTND = Fagerstrom Test of Nicotine Dependence; GNSBQ = Glover–Nilsson Smoking Behavior Questionnaire; AUTOS = Autonomy Over Smoking Scale), and satisfaction ratings for Own-Brand tobacco and nicotine electronic cigarettes (NECs).

	1	2	3	4	5	6	7
1. Income							
2. Age	.23***						
3. Education	.20***	-.11*					
4. FTND	.05	.17**	-.23***				
5. GNSBQ	.01	.03	-.06	.52***			
6. AUTOS	-.02	.01	-.10	.55***	.76***		
7. Own-brand	-.03	-.02	-.06	.10	.19***	.22***	
8. NEC	.02	.06	-.10	.04	.10	.10	-.14**

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